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STRATEGY AND POLICY OF ECONOMIC DEVELOPMENT IN UNDERDEVELOPED COUNTRIES: A SIGNIFICANCE OF THE STAGE THEORY

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I. Introduction: From the "Type-Approach" to the "Stage-Approach"

The last few years have brought a remarkable advancement in the studies of economic development theories of underdeveloped countries¹ both in deepening of the problem-consciousness and in refining the method of approach. This paper is primarily intended to point out a marked tendency toward the stage-approach from the type-approach as an indicator for deepening and refinement of present-day theories of development and clarify what implications such a change of approach has for strategy and policy of economic development in underdeveloped countries.

By the type-approach I mean the way of thinking that lays stress on the problem of how to grasp the structural characteristics of the areas destined for development. If their structural characteristics are considered to be "underdevelopment", a purely economic theory of development with a purely economic "model" approach will be formulated. If they are considered to be "backwardness", a socio-economic theory of development with a socio-economic "system" approach will be formed. And if they are considered not only to be backwardness but to be "colonial backwardness", a politico-economic theory of development with a politico-economic "stage" approach will be constructed. In this sense, differences in grasping the structural characteristics (types) of the areas determine essentially the method of approach and the structure of development theory.

When I speak of a tendency toward the stage-approach from the type-approach, there can be no doubt about that it has a close connection with the deepening of the problem-consciousness in the type-approach, that is, from underdevelopment to backwardness and from backwardness to colonial backwardness. That a purely economic concept of underdevelopment in the type-approach was taken over by a socio-economic concept of backwardness indicates that the heart of the development problem does not consist in the problems of mere capital formation, raising income, or industrialization, but in the problem of *transition* from stagnant traditional society to self-sustained modern society. If so, points of issue center around the measurement of direction, size, form, and pace of the structural changes which appear in the impact-and-reaction process of political, social, economic and cultural factors during the transition. Clearly, this is one of the important evidences of the deepening of the problem-consciousness in the type-approach.

Similarly, that a socio-economic concept of backwardness gave way to a politico-

¹ Professor Higgins has presented a comprehensive review and excellent comments on the recent studies of economic development theories. See Benjamin Higgins: *Economic Development: Principles, Problems, and Policies*. New York 1959. 803 pp.

economic concept of colonial backwardness indicates that the problem of transition does not remain a mere problem of structural change in such a evolutional process as a series of disintegration and reintegration of traditional society. But it involves, by its very nature, structural change in a revolutionary process in terms of a series of discontinuous "jumps", that is to say, "system-change" of colonial backwardness.

Thus the deeper reflections on type-approach have attached a great significance to the concept of transitional stage between stagnation and development. And in connection with that concept, the really crucial point is that clear distinction should be made between the phase of continuous evolution and that of discontinuous revolution at transitional stage. In this situation of the problem-consciousness, one might readily recognize the significance of stage-approach. But, a more detailed explanation must be made of how such an intellectual climate has developed recent years.

II. Development Start and Development Strategy

The fundamental problem of the economic development of underdeveloped countries is how it is possible for them to make change the state of economy from stationary, slow-moving, or stagnant into rapidly and continuously developing. Correct understanding of all the significance of this problem would imply the importance of the transition from one stage to another, which should only be solved with a whole system of development policy that includes development strategy, as we shall see later. From a stanpoint of purely economic approach, this was, first of all, taken up as a problem of "developmental start".²

Concerning this problem of development start, that is to say, the problem of how to break the inertia of stagnant economy and how to gain momentum to start towards development, a theory called "Big Push" theory was firstly presented by P. N. Rosenstein-Rodan.³ He argues that, in order to overcome the stagnant economy at the initial stage of underdeveloped countries, even "a minimum speed and size of investment" must be "big" enough to "jump" over the economic obstacles to development, if it is to have any chance of success. His theory is based on the following three theoretical assumptions of "Indivisibilities": (1) Indivisibility in the production function especially the indivisibility of supply of Social Overhead Capital (lumpiness of "capital"), (2) Indivisibility of Demand (complementarity of demand), (3) Indivisibility (kink) in the Supply of Savings (the zero or very low price elasticity of supply of savings and the high income elasticity of savings). With these assumptions of indivisibilities he described his basic idea of growth at the development start. Rosenstein-Rodan's "big push" theory may be said a theory of development strategy which uses a kind of "shock-treatment".

It was Harvey Leibenstein⁴ that developed "critical minimum effort" thesis with different way of explanation, although he was aware of the similar problem with Rosen-

² This term is used by Charles P. Kindleberger in *Economic Development*. N. Y. 1958. p. 309

³ P. N. Rosenstein-Rodan: *Notes on the Theory of the "Big Push"*. M.I.T. Center for International Studies, Cambridge, March 1957 (mimeographed) pp. 1-16.

⁴ Harvey Leibenstein: *Economic Backwardness and Economic Growth*. N. Y. 1957. pp. 47, 18, 21, 34, 16, 170-171.

stein-Rodan. Leibenstein attributed major characteristics of economic backwardness to (1) the low agricultural yields, (2) the lack of non-agricultural employment opportunities, and (3) the role of the general demographic characteristics in the dynamics of backwardness. He defines the state of backwardness based on these characteristics as a "quasi-stable equilibrium" system. According to his definition, a quasi-stable equilibrium means "a condition where only *some* aspects of the system are stable." "That is, after the initial disturbance of the equilibrium position the system will not settle down to the same equilibrium values as before but only *some* of the variables will return to their initial values." (p.18) In this case, by some of the variables he meant per capita income. In other words, when the system receives a certain kind of stimuli, "the initial effect of which may be to increase resources per head, but eventually there is a return to the initial equilibrium per capita income while other magnitudes remain at their expanded level" (p.21) Therefore, the efforts result merely in the expansion without development.

Hence the problem of development is that "under what conditions, or with stimulants of what magnitude, it is possible, within this framework of such a quasi-stable equilibrium, to achieve sustained growth in per capita incomes rather than a tendency to return to the low, underdeveloped, equilibrium income level." (p.34) According to Leibenstein, a necessary condition that makes sustained growth possible is to give the economy, "at some point, or during some period, a stimulus to growth that is greater than a certain critical minimum size." (p.16) Concentrating his attention on the decisive aspect of population growth in relation to income growth, Leibenstein pointed out that the increase of per capita national income can be attained only when the per capita income level is raised at and beyond the point of intersection of the one curve which indicates the level of per capita income required to generate a level of national income growth equal to the rate of population growth, with the other which shows the relationship between per capita income level and the rate of population growth (p.170). Put it in another way, the level of per capita income shown at the intersection of both curves can be regarded as "the critical minimum per capita income that has to be achieved if we are to have sustained internally generated per capita income growth" (p.171)

Thus the realization of the problem of development start produced a general theory of the "Big Push" and a specific theory of the "critical minimum effort," which aroused considerable attention of people.

Yet earlier, Ragnar Nurkse⁵ proposed the idea of "balanced growth" to be the sole measure to break, from the demand side, the state of "underdevelopment equilibrium", which is characterized as a perfect "vicious circle" in both supply and demand sides of capital formation. According to Nurkse, the reason why the underdeveloped countries lack demand for investment is that the use of capital equipment in the production of goods and services for the domestic market is limited by the narrowness of the size of the market. Since the incentives for investment are always confined with the extent of the market, all depends on how to enlarge the size of the market. Because what determines the size of the market is after all the principles of productivity, it is necessary to expand a complementarity of demand among industries, which would raise productivity. Therefore,

⁵ Ragnar Nurkse: *Problems of Capital Formation in Underdeveloped Countries*. Oxford 1953. pp. 11-17.

basic measures to be taken for the enlargement of the size of the market and the creation of incentives for investment should be "more or less synchronized application of capital to a wide range of different industries".

Nurkse's doctrine of balanced growth was criticized by Hans Singer⁶ as "premature rather than wrong, in the sense that it is applicable to a subsequent stage of sustained growth rather than the breaking of a deadlock." It is "an implausible solution" of the problem of development strategy for development start in underdeveloped countries. Nurkse's positive merit goes rather to the exploration of "disguised unemployment" to be utilized in the real capital formation as one of the means to break vicious circle in the supply side of capital formation.

Albert O. Hirschman⁷ advocated deliberately the development theory of "strategic imbalance" criticizing Nurkse's balanced growth theory and placed greater significance rather on a "sequential or chain solution" of related new investments than synchronized and multiple investments. Of course, Hirschman himself fully admitted the importance of complementarity effect of investment, on which Nurkse's balanced growth was founded, but the way of argument was quite different. While Nurkse observes the realization of complementarity effect on the horizontal level, Hirschman, on the vertical level, attaches importance to the mechanism in which investment of a certain period induces another investment at the other period through complementarity effect and external economy.

According to Hirschman, the essence of the development strategy is how to establish effective "mechanisms that tend to maximize induced investment decisions" and how to start "new development blocks" which tend to bring in the development process related new investments in a form of chain-reaction.

He emphasizes that the role of investment on the economic scene is not only "income-generator" and "capacity creator" but also, as the most important role, "pace-setter for the additional investment". For example, the fact that investment in the production of commodity A sets up strong pressures for an increase in the production of commodity B and at the same time strong incentive for the start of production of commodity C indicates such a role of investment as pace-setter. Hirschman laid stress on the third role of investment, that is, "pressures and incentives", power to push and power to pull. And he pointed out that, when investment criteria have to be elaborated in the process of industrialization, the "postponement choices", that is the way to choose AB instead of BA, the most efficient sequence on the basis of a comparative appraisal of the strength with which progress in one of the areas will induce progress in the other, is of much more importance as development strategy in underdeveloped countries than the "substitution choices", that is the way to choose A instead of B simply on the basis of a comparative productivity.

With this concept of "efficient sequences", Hirschman discusses the "unbalanced growth" between social overhead capital (SOC) and directly productive activities (DPA), and further more the "forward linkage effects" and the "backward linkage effects" that may be considered to be two inducement mechanisms within the DPA sector, throwing

⁶ Hans W. Singer: "The Concept of Balanced Growth in Economic Development: Theory and Practice", *Economic Growth: Rationale, Problems, Cases*. Ed. by Eastin Nelson, University of Texas Press, Austin 1960. pp. 71-86, 79, 81.

⁷ Albert O. Hirschman: *The Strategy of Economic Development*. New Haven 1958. pp. 78, 98, 41, 78-79, 100-104.

a light on such well-known alternatives as agriculture versus industry, export promotion versus import substitution, heavy versus light industries etc. And he concludes by maintaining that the economic growth process which aims at maximization of the *combined or joint linkage effects* must be "a chain of unbalanced growth sequences"

The problem-consciousness and the method of approach suggested by Hirschman as a strategic theory of development of underdeveloped countries at the development start are worth paying special attention. The major merit of Hirschman's theory exists, I would say, in his basic idea that development process must be a continuous process of discontinuity (unbalance) in terms of the most efficient sequences. In his theory of strategic imbalance which aims at the linkage effects of investments on a vertical level instead of investment effect once for all, the idea of "dimensional jumps", which do not mean circular growth within one dimension but jumping and cumulative development from one dimension to the other, is implied. In that sense, Hirschman's theory of development strategy as a theory of dimensional jumps is to have a deep implications for the theory of stages of economic development.

III. *The System-Change and the Stage-Shift*

By penetrating into the problem-consciousness of development start, the limitations of the purely economic approach will be revealed. The reason is that the problem of development start in backward countries should involve the problem of the change of socio-economic system, which is not less important than the problem of income, investment, capital formation, etc. So far as the target areas for development are neither underdeveloped nor backward countries but *colonial* backward countries, the problem of socio-economic system is of paramount importance. And so far as we consider this problem is important, it is necessary for us to change our view point from the strategic theory of dimensional jumps to the policy theory of system-change or stage-shift.

It was, first of all, Boeke, then Myint and Myrdal, that pointed out the problem of the change of socio-economic system as one of the most basic problems with which colonial backward countries are confronted.

Basic view point of the people who are in favor of socio-economic approach is that they try to understand the process of development or initial start of backward countries, not only as an economic process but also as a social process, that is to say, as a socio-economic process. In other words, the problem of development start is that of "structural change" within a society. It is not an organic growth or gradual evolution. It should be understood in linkage with the concept of *transition*, which involves the qualitative change of social system.

The problem of structural change is the problem of "transitional shift" from one socio-economic system to the other. When we take up the problem of structural change in today's backward countries, the first question that arises is whether the society concerned is homogeneous or heterogeneous. In Western society which could be regarded more or less homogeneous, structural change or transitional shift took place in the endogenically growing process. In the colonial backward society, however, which is heterogeneous, structural change would never occur endogenically.

It was J. H. Boeke⁸ that clarified the nature of the problem from this point of view. Boeke's theory of "dualistic economy" paid special attention to the heterogeneous dualism between *indigenous* socio-economic system, namely "a precapitalistic agrarian community," and *alien* socio-economic system, namely, "an imported western capitalism." He contends that this indigenous system, in spite of the impact of alien system, would not admit the process of transitional shift from the former to the latter, while emphasizing the simultaneous coexistence of both systems. In other words, the indigenous system puts up a stubborn resistance to the disintegrating forces of alien system and tends to persist to hold its own system at its core, be it not undamaged at its peripheries. Such stubborn resistance put up by the indigenous system constituted a force for sustaining economic stagnation of Asian society. Boeke's theory of dual economy after all denies the possibility of structural change towards the modernization of Asian society. However, Boeke's theory deserves our attention in the sense that it is an attempt to make clear the basic reason for colonial backwardness.

In spite of his elaborated arguments, however, Boeke overlooked one basic point at issue. He attributed the difficulties of transition in dual society from one system to the other to such socio-psychological factors as "limited wants" or "lack of profit-seeking motive" in indigenous society, but the real cause should be traced back to the more deep-seated factors.

Now, what does the capitalistic system in dual society mean? In my judgment, it is not only an "imported" capitalism but an imported "colonial" capitalism. Colonial capitalism, just because it is colonial, achieves its end in the most merciless way through extra-ordinarily free play of economic forces that detached from a controlling power of "common social will".⁹ And, in that case, what should be especially noted is that the capital brought into colonies is not mere capital but monopoly capital backed up by the colonial political power. Colonial capital as such becomes a master of the industrial life and economic activities in dual society. It means that the existence of such political and economic disequalizing factors as colonial capitalism crushes the active volition of indigenous people, deprives them of opportunities of economic activities, and causes fossilization of their roles as peasant producers and unskilled workers.

Today, almost all of the Asian countries are politically independent. But they have not yet shaked themselves free from the past colonial economic structure and dependency. Therefore they are suffering from monopolistic domination of foreign big enterprises and plantations, intermediary exploitation of foreign Asiatics (overseas Chinese and overseas Indians), uncertainty of export income of monocultural primary products and the deterioration of terms of trade.

It was colonial socio-economic system that brought about internal and international disequalizing factors which hamper developmental possibilities from within the indigenous society. Turning our eyes on such basic facts, we can understand simultaneous coexistence of capitalistic system and pre-capitalistic system in dual society and difficulties of transi-

⁸ J. H. Boeke: *Economie van Indonesië*, vierde herziene druk, Haarlem 1953, 401 blz.; *Economics and Economic Policy of Dual Societies as Exemplified by Indonesia*, N.Y. 1953, 324pp. For my critical comments on Boeke's theory, see Yoichi Itagaki: "Some Notes on the Controversy concerning Boeke's 'Dualistic Theory': Implications for the Theory of Economic Development in Underdeveloped Countries" *Hitotsubashi Journal of Economics* Vol. I, No. 1, October 1960, pp. 13-28.

⁹ J. S. Furnivall: *Netherlands India: A Study of Plural Economy*. Cambridge 1939. pp.446-469.

tion process from one to the other, as was pointed out by Boeke. Social chasms and rigidities in dual society thus can be regarded as remnants of the past colonial capitalism.

Thus interpreted, the greatest problem with which colonial backward countries are confronted at the initial stage of economic development is the problem of disequalizing factors derived from heterogeneous dualism or pluralism in socio-economic system. The facts of these disequalizing factors should not be considered mere problems of such dualism as subsistence-type of economy versus market-type of economy, or rural economy versus town economy, but, if we want to disclose the reality, we must trace back to the antagonisms and tensions inherent in the heterogeneous dualism, that is, alien versus indigenous, colonial versus national economy. In other words, disequalizing factors are "*heterogeniteit des arbeidproces*" generated from power relations between alien element and indigenous element, and colonial system and national system. In this respect J. van Gelderen¹⁰ is far more advanced than Boeke in his understanding of the reality of colonial economy.

It was Hla Myint¹¹ that most emphatically stressed the point that disequalizing factors were generated from power relations of conflict between alien element and indigenous element. According to Myint, initial differences of experience, opportunity, capital, and technique which existed at the outset between advanced nation (alien colonists) and backward nation (indigenous inhabitants), were intensified solely by the unhampered play of market forces, and disequalizing factors, which work cumulatively unfavorable to the latter, brought about "the fossilization of the backward people in their conventional roles." In this sense, basic causes of economic backwardness and stagnation can be attributed to the colonial and pluralistic socio-economic system. Thus Myint concludes that the problem of development start might be solved by rational organizing effort of economic nationalism as an countervailing power to the disequalizing factors.

Gunnar Myrdal¹² also attached importance to the existence of internal and international disequalizing factors in backward countries, and focused attention on the tendency of more and more increasing economic disequalization. He formulated it as the assumption of "the circular causation of a cumulative development process".

According to Myrdal, in backward countries where general level of economic development is low, "backwash effects" always act strongly to offset "spread effects" under the free play of market forces, which has a tendency to intensify inequality by circular causation of cumulative process. He points out that this tendency is much more excessive in backward countries which were under colonial rule. He made this point when he said that "colonialism meant primarily only a strengthening of all the forces in the markets which anyhow were working towards internal and international inequalities. It built itself into, gave an extra impetus and a peculiar character to, the circular causation of the cumulative process" (p.60).

The greatest remnants colonialism left over to the dependent countries can be seen in the fact that colonial society was not given "national and economic integration", which is indispensable requirement for the continuous and autonomous economic growth. The

¹⁰ J. van Gelderen: *Voorlezingen over Tropisch-Koloniale Staathuishoudkunde*, Haarlem. 1927.

¹¹ H. Myint: "An Interpretation of Economic Backwardness" *Oxford Economic Papers*, Vol. VI, No. 2 June 1954, pp. 152, 163.

¹² Gunnar Myrdal: *Economic Theory and Underdeveloped Regions*. London 1957 pp. 86, 60, 58, 83, 81, 51, 67.

colonial economy can be characterized as "enclave"¹⁸ economy, cut out and isolated from the surrounding economy but tied to the economy of the metropolitan country. Such segregation hampered transfer of culture, including technical skills and the spirit of enterprise, and therefore the spread of expansionary momentum, to the indigenous population. He argues that the existence of the privileged classes which are, by and large, primarily interested in the social and economic *status quo* can be regarded as a support of economic stagnation which is mainly caused by the social chasms and rigidities that are inimical to the strengthening centrifugal spread effects. For these reasons, Myrdal contends that basic problem of development in colonial backward countries must be to break the socio-economic barriers and rigidities that hamper upward cumulative expansion, and to realize a "national economic integration" in the country concerned. He states that "land reforms have their significance in the national plan not only as a precondition for raising productivity in agriculture, but primarily as a means of shattering the foundations of the old class structure of a stagnating society". (p.81) "Relations between relative lack of national economic integration and relative economic backwardness run both ways." (p.51)

Thus Myrdal's conclusion is that getting rid of disequalizing factors and breaking colonial backwardness entirely depend upon national planning of national economic integration, which is assigned to the task of "rational nationalism".

The above mentioned suggests that in the light of the common view point of people who take socio-economic approach the key problem of policy for backward countries at their development start is nothing but the problem of the "system-change" from colonial to national system. The problem of "stage-shift" from traditional, stagnant society to modern, developing society will not come up unless such problem as system-change is solved, so long as the traditional is given a character of colonial backwardness. In this respect, socio-economic approach and politico-economic approach together form a united front.

Now here remains another problem concerning system-change. By system it is meant here in the context of colonial versus national system, and not in the context of capitalistic versus socialistic system. Therefore, to make distinction between the two, let us call the former "system-transformation" (socio-economic concept) and the latter "system-revolution" (politico-economic concept). And it can be said that system-revolution always requires system-transformation as its precondition.

As to system-revolution, however, there may be two possible ways for it to take either capitalistic or socialistic pattern. As a matter of fact, the third possible way might be as plausible, that is to say, so-called "mixed system" revolution of both capitalism and socialism, as is the case of India. At any rate, three possible ways are open to the colonial backward countries in accordance with their different historical backgrounds, social structures and economic conditions. In connection with these possibilities, one of the major criteria for judgment seems to be that the more severe the segregation and chasms within the dual or plural system of society and the more rigid the remnants of colonial capitalism, the bigger the possibility of system-revolution to socialist system.

¹⁸ For the term of "enclave", see Gunnar Myrdal: *An International Economy: Problems and Prospect*, N. Y. 1956. pp. 100-101.— "The Europeans instead established reserves for themselves in these countries, as islands in the ocean of colored people."

IV. *The Significance of the Stage Theory and Its Implications for Policy Theory*

As is stated above, the problem of stage-shift from stagnation to development involves that of system-transformation and eventually system-revolution. Thus we can see that the problem of development start in colonial backward countries must be viewed from a whole system of strategy and policy of economic development.

I use these two terms, strategy and policy, in categorically different meanings, because strategy is a kind of action designed to be most effective in making shift from one phase to the other within a certain framework of the system, and on the other hand, policy is a kind of action designed to be most effective in achieving shift from one stage to the other, changing the system itself within which strategy is to be operated.

Both of them commonly share the concept of self-negation, that is discontinuous "jumps", which is implied in the concepts of phase-shift and stage-shift. They are, however, quite different in the sense that, while the strategy is the "system of technical judgment" for choice, policy is the "system of value-judgment" for choice. The system of value-judgment embraces the system of technical judgment and the goal of strategy is determined by the end of policy.

I am not intending here to work out a systematic interpretation of policy theory. What I would like to suggest now is that policy theory for development of backward countries must have as its premise a certain historical socio-economic system (colonial socio-economic system, for example) and that it must be designed to be a theory of historical-practical formation, of which problem is likely not only sequential shift from one phase to the other but also discontinuous shift from one stage to the other. Now we have come to evaluate the role of "stage approach" and its significant implications for policy theory.

Recently Prof. W. W. Rostow presented a new theory of the "Stages of Economic Growth"¹⁴ and came into the limelight.

Rostow, from an economic historian's view point, generalized historical development process of all modern world, which includes backward countries as well as advanced countries, in five stages from the point of view of economic growth. With this he advocated the politico-economic interpretation of history that challenges Marxian historical materialism. I do not think it necessary to introduce his system of five-stage theory in detail. So I would like to confine myself to some of important aspects of his theory which have direct connection with our present issue.

The first characteristic of Rostow's stage theory is that his views are presented as a policy theory of stage-shift. It should be noted that his concept of stage is conceived as a "choice of policy" and has nothing to do with a concept of historical necessity. In this sense, too, it implies a definite challenge against the materialistic view of history.

The second characteristic is that he gives "the stage of transition" an independent and

¹⁴ W. W. Rostow: *The Stages of Economic Growth :A Non-Communist Manifesto*. Cambridge 1960, 179pp; "The Stages of Economic Growth", *Economic History Review*, Second Series, Vol.XII, No.1, August 1959, pp. 1-16; Max F. Millikan and W. W. Rostow: *A Proposal: Key to an Effective Foreign Policy*. N.Y. 1957. pp. 43-54; "The Take-off into Self-sustained Growth," *Economic Journal*, March 1956, pp. 25-48.

important position among the five stages of economic growth. Rostow's stages of growth consist of five stages, that is : (1) the traditional society, (2) the transitional society, (3) the take-off, (4) the drive to maturity, (5) the age of high mass-consumption. The most important stage among them is the third "take-off" stage. Once society enters this stage, there is no more danger of reversion nor retrogression, and old blocks and resistances to steady growth are finally overcome. It means the society arrived at the stage where sustained, regular growth became its normal condition. It is merely the matter of time and choice to advance from this stage to the stages of technical maturity and high mass-consumption. Categorically speaking, Rostow's five stages can be reduced to three stages: traditional, transitional, and modern. In other words, the last three stages can be considered to be three phases of the stage of modern society.

When we talk about the stage-shift, its essential point is that how the society can switch over from the stagnation stage of traditional society to the take-off stage of modern society through the preconditions stage for take-off of transitional society. Under what impulses did the traditional society begin the process of its modernization? What were the forces that promoted or hampered the transitional process? What forces made the transitional society taken-off and set it on the road to regular and self-sustained growth? This was the essence of Rostow's problem-consciousness and way of thinking in constructing stage theory.

In so far as stage theories of economic development have been expounded by the German historical school,¹⁵ no one has ever incorporated the concept of transitional stage in one's system as Rostow did deliberately. In this sense, Rostow's new stage theory has a great significance in the policy theory for economic development of backward countries where much attention should be paid to the transitional stage which links the first and the third stage.

Thirdly, examining critically Rostow's theory from our view point, we can hardly say that preconditions for take-off that must be prepared at the second transitional stage, have nothing to do with the analysis of stagnant factors in the socio-economic system of the first traditional society. If so, we feel, we have to raise question about what is the traditional society. A vital point concerning our interpretation of the problem is that traditional society must be classified at least into two distinct categories, namely, such traditional society as Western society which was not a colony and the other, the traditional society which was under colonial rule. Special attention should be paid to the structural heterogeneities inherent in the traditional society which was under colonialism. In this society, dualism or pluralism of power structures, economic organizations and cultural value-systems are generated out of the very reasons of having been once a colony, in addition to the stagnant characteristics common to all traditional societies. And the antagonisms, tensions, rigidities and fossilizations produced by the disequalizing factors at work in the society have become forces that make difficult or retard the switching-over from

¹⁶ Recently Professor Hoselitz has made a comprehensive and very suggestive appraisal of the theories of stages of German historical school from standpoint of economic development in underdeveloped countries. A new theory of economic development is to be produced by him with a systematization of his ideas on "patterns" and "stages" of economic growth. See, Bert F. Hoselitz: "Theories of Stages of Economic Growth," *Theories of Economic Growth*. Ed. by B.F. Hoselitz and associates, Free Press of Glencoe, Ill. 1960. pp. 193-238, and also, *Sociological Aspects of Economic Growth*. By B. F. Hoselitz. Free Press of Glencoe, Ill. 1960. pp. 1-144.

the traditional to the transitional and the shifting from the transitional to the take-off.

I cannot emphasize too strongly this point because it is particularly important for the correct understanding of the role of policy efforts at the transitional stage. Today's governments of colonial backward countries are trying in the period of transition to take up or push forward a policy of "nationalization" in one form or another. This indicates that they claim to be released from monopolized domination of foreign big enterprises, big plantations, big firms and banks with a view to eliminating the deep-seated disequalizing factors. The drive to "land reform" and "cooperatives" is nothing but the efforts to be set free from parasitic exploitation of foreign Asiatics, money-lenders and intermediaries. In short, they aim at national economic integration by "de-alienization" policy.¹⁶

The existence of such internally disequalizing factors nullified the possibility of autonomous and spontaneous development from within the indigenous societies in Asia. We should realize that the nature of the stagnant backwardness in the Asian traditional society is not so simple. And this is the basic reason why the outlook for modernization of Asian traditional society in the transitional period is so complicated, and why the establishing preconditions for take-off is so difficult. Therefore, it would not be sufficient for the preconditions merely to invest social overhead capital and create the external economy. Beside these there exists a vital need to eliminate disequalizing factors within the colonial socio-economic structures. And this vital need raises the problem of "system change" and eventually provokes the problem of "system revolution". Rostow called communism "a kind of disease which can befall a transitional society if it fails to organize effectively those elements within it which are prepared to get on with the job of modernization".¹⁷ With this statement Rostow plainly suggests how things are.

Clear definition of the traditional society at the development start is of paramount importance to understand the nature of whole socio-economic problems in transition period. In this sense, that Rostow identified the character of colonial traditional society, more or less, with the one of Western non-colonial traditional society, makes narrower the effective range of his stages of growth theory.

While we correctly evaluate the merit of Rostow's stage theory, we must refine it from new point of view and develop it as a powerful apparatus to build a policy theory of development to be more effectively applied to the backward countries.

The essence of the stage theory does not exist in the universalistic reflections on the whole process of history, nor in the theoretical devices to find the uniformities or regularities of the historical process for purposes of comparison. The point is not the problem of periodization of past history, but the dynamic inner logic of transitions from one stage to another in historical perspectives.

Shift from one stage to the other is not made without discontinuous "jumps". The inner logic of transitional shift must be based on the inner logic of self-negation. Dialectic is surely an inner logic of self-negation. But the stage theory does not take the dialectic view point. While dialectic takes the history as the self-developing logic of the idea of "absolute universality", stage theory attempts to grasp the history as the

¹⁶ This term has been created by Professor Golay. See, Frank H. Golay: "Commercial Policy and Economic Nationalism," *Quarterly Journal of Economics*, November 1958. pp. 574-587; *The Philippines: Public Policy and National Economic Development*. Cornell Univ. Press, Ithaca 1961. (Chap XIV), p.313.

¹⁷ W. W. Rostow: *The Stages of Economic Growth*, Cambridge 1960 p. 164.

"*gestaltende*" process of "relative universality" or "reflective universality". In this sense stage theory takes the position of *Existenziale Ontologie*.¹⁸

We are not going to elaborate the concept of policy in terms of stage theory. What I just attempted to suggest is that from a new angle the significance of the stage theory should be reevaluated in the context of its implications for a policy theory of economic development in underdeveloped countries.

¹⁸ Yoichi Itagaki: *SEIZI-KEIZAIGAKU NO HŌHŌ* (*Methodology of Political Economics*), Part I, Chap. 1 (The Ontological Foundation of Policy Theory); Part II, Chap. 3 (The Problem of Theories of Stages and Its Development). Tokyo 1942. pp. 35-114, 377-404.

BALANCED GROWTH AND THE PROBLEM OF AGRICULTURE*

—with special reference to Asian peasant economy—

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I. *Introduction—the problem*

The recent literature of economic growth pays particular attention to the problem of "balanced growth". Two different phases of the problem are taken up, though they are interrelated with each other. One is a purely theoretical approach and its problem is to examine the existence and stability of balanced growth paths in a general equilibrium system under certain assumptions. The other concerns practical strategy for economic development as its objective, though in most cases it is given some sort of theoretical basis. There are two types among the second group,—"balanced growth doctrine" of the Nurkse-Rodan type¹ and that of the A. Lewis type². The former advocates a plan of simultaneous investment for industrialization and mainly concerns the investment criterion *within* the modern sector, while the latter deals with balanced growth between various sectors of the economy, in particular, between industry and agriculture. I want to deal with the problem of agriculture in a general framework of balanced growth equilibrium, so that this paper concerns both theoretical and empirical phases of the problem, although the main interest lies in the practical problem of the Lewis type.

H. T. Oshima recently stressed the strategic importance of agricultural development as against industrialization-minded theories and policies with special reference to Asian economic development problems.³ Similar assertions can be found in the literature of agricultural economics,⁴ but very few in the circle of general economists. A remarkable exception is Kaldor's paper, as far as I know.⁵ I myself share with these opinions. The place and significance of the peasant economy, however, seems to remain not fully clarified

* I have benefited from discussions and comments from my colleagues at Hitotsubashi University and from the group of agricultural economists in Tokyo. I would like to thank all of them.

¹ P. N. Rosenstein-Rodan, "Industrialization of Eastern and South-eastern Europe," *The Economic Journal*, 1943. Ragnar Nurkse, *Problems of Capital Formation in Underdeveloped Countries* (Oxford, 1953).

² Arthur Lewis, *The Theory of Economic Growth* (London, 1955). Albert O. Hirschman criticised this version of the balanced growth concept and said this is "essentially an exercise in retrospective comparative statics" in Chapter 4 of his book "*The Strategy of Economic Development*" (New Haven, 1959). In my impression, he seems to disregard entirely the problem of backward sectors, where almost no automatic incentives can be expected in the balancing adaptation process of the economy.

³ Harry T. Oshima, "*A Strategy for Asian Development*", 1961, an unpublished paper.

⁴ As a best example, we can quote William H. Nicholls' paper "*The place of Agriculture in Economic Development*", presented to the Gamagori Conference of I.E.A. in 1960.

⁵ Nicholas Kaldor, Characteristics of Economic Development, in "*Essays on Economic Stability and Growth*" (London, 1960).

in the general framework of economic development possibilities. One of my aims is to give further clarification along this line.

Another aim is to determine the possibilities of farmers' "income parity" with urban workers in the course of sustained economic growth. This topic concerns almost all advanced countries, because the real situation is apt to be toward disparity unfavourable to farmer's side, and this problem is particularly important in a country like Japan, where the factor-proportion or man-land ratio is extremely unfavourable in agriculture. Eight years ago I proposed a concept of "disguised equilibrium growth", in which I tried to give a proof of possible existence of farmer's income parity with industrial workers in the course of sustained growth.⁶ Recent reflections, however, revealed shortcomings of my old setting, so that here I want to try to set it again in a more accurate form, in particular, in the light of general equilibrium of balanced growth.

The two aims can best be fulfilled by the common approach of a two-sector model, composed of capitalist sector and self-employed sector, because the process of economic development is that of enlarging the former and contracting the latter. Theoretical strictness will be sacrificed to some extent in order to weigh the practical considerations in meeting the real circumstances. I shall stress the importance of output balance, in particular that of food, the main output of the self-employed sector. Hence the discussions that follow depend upon the key assumption that food can be supplied only by the self-employed sector to meet the demand from both sectors. In my knowledge, this assumption is appropriate to most countries in Asia, including even Japan, and without placing this fact at the centre of theoretical formulation, no attempt can be successful in analysing the problem of economic development. Thus we arrived at a different conclusion from other authors' approaches. A. Lewis rightly treated this point, but did not elaborate it in connection with his general thesis of "unlimited supply of labor".⁷ The concept of unlimited supply of labor or that of disguised unemployment, though they differ from each other, seem to deserve skepticism both in theoretical and practical application to the problem

⁶ K. Ohkawa, "Nogyo no keizai bunseki" (Economic Analysis of Agriculture) Tokyo, 1953. "Disguised" was used because of lack of better expression, in order to distinguish this kind of equilibrium from the ordinary one, with regard to its dual characteristics: this implies inequality of marginal productivity of labor between agriculture and the capitalist sector, and the fact that farmers proprietors consider the so-called mixed income (rent and other non-wage income as well as wage income together) they receive as if this were the compensation for their work.

By the way, my recent survey reveals that on average of many advanced countries the average per head income in agriculture is almost equal to the average wage earnings in the non-agricultural sector. This may be valid only in a broad sense, but does give us an empirical background for the concept of "disguised equilibrium". See K. Ohkawa, "Shotoku, Rodoryoku no Sangyokan Bunpai no Chokihenka" (Long-term Changes in the Industrial Distribution of Income and Labor Force) in the *Keizai Kenkyu*, Vol. 12, No. 3, July 1961.

⁷ W. Arthur Lewis, "Economic Development with Unlimited Supply of Labor", *The Manchester School*, May 1954, and "Unlimited Labor: Further Notes", *The Manchester School*, January 1958. I benefited very much from these excellent papers, but I wonder why the interesting discussion on the output equilibrium between the capitalist sector and agricultural sector is entirely separated from the general thesis of unlimited supply of labor. Kenjiro Ara's two-sector model is very suggestive, being finely built by a strictly theoretical formulation, but he treats no condition with regard to the output equilibrium of food between the two sectors. See "Nijukozo no ichi mokei" (A Model of Dual Structure), *The Ikkyo Ronso*, Vol. 42, No. 5, November 1959.

of initial economic growth, when they are not backed up with food supply possibilities.

In the treatment of "income parity" problem in the course of sustained growth also, the foregoing condition of food supply is not dispensable in determining the conditions required to maintain a balanced growth equilibrium. We arrived at a conclusion that the "disguised equilibrium" can be maintained with a possibility of a general balanced growth path subject to a certain condition. In this respect, we will conclude by stressing the strategic importance of government policy regarding agricultural technical development.

II. *Stationary state of two-sector equilibrium*

The economy is assumed to be composed of two sectors as mentioned above. Hereafter we call the former the "sector I", and the latter the "sector II".⁸ (In the following suffix 1 stands for the capitalist sector, and 2 for self-employed sector). The basic assumption is that each sector is producing different things. The sector I produces both capital goods and consumption goods other than food, while the sector II produces food only. Of course this is a great simplification. In reality, the latter sector produces many kinds of consumption goods of the traditional type and even some capital goods, and some goods are supplied competitively by both sectors. Our assumption of no substitution of supplying food between the two sectors, however, may be a reasonable one in order to raise up the core of the problem. In fact, where the land value is too high because of excessive demand for it by peasants as a means of self-employment, the capitalist does not like to enter the production of basic food. We ignore the landlords and assume all the agricultural land is directly cultivated by self-employed tillers. In reality the negative role played by the landlords in economic development deserves particular attention in most Asian countries, because the "surplus" produced in the sector II is apt to be spent by them on employing "non-productive" labor in the classical sense. It is not difficult to take this fact into consideration in our model, whenever necessary, without altering its basic nature. This is merely a first approximation in reply to our present problem.

We assume that the output of the sector I (Y_1) and that of the sector II (Y_2) can be measured by a common unit of one sort or another and we will treat them in real terms, without entering into the puzzle of index number problem. We assume that the existence of capital stock (K) in the sector I, and that of land stock available to food production (L) in the sector II, in other words, that there is no land in the former, no capital in the latter. The unit of measuring capital stock is simply assumed to be common to that of output, mentioned above, and no differential quality or location of land is assumed, so that we can avoid the difficulties of measuring capital and land stock. There are a certain number of labor force population in the sector I (N_1) and in the sector II (N_2) in terms of

⁸ I tried a two-sector model of the capitalist sector and the non-capitalist sector in my earlier paper "Fukinto seicho to teii koyo" (Unequal growth and under-employment), in "Nihonkeizai no bunseki" (An Analysis of the Japanese Economy) Vol. II Edited by Tsuru and Ohkawa, Tokyo, 1955. The non-capitalist sector does include landlords as its essential element. Here we prefer the *self-employed* sector, which roughly corresponds to the "subsistence sector" in Lewis' terminology. But I prefer "self-employed" rather than "subsistence" because this sector is not self-sufficient but has normal trades with the capitalist sector.

man-year labor of homogenous quality and we assume no technical difficulty in transferring labor force between the two sectors. The number of consuming population is assumed to correspond to these numbers N_1 and N_2 .

Two production functions are given in a general form like $Y_1=F_1(K, N_1)$ and $Y_2=F_2(L, N_2)$, where a decreasing return is assumed for both functions. As for distribution and expenditure of income, the followings are assumed for the sake of simplicity. Y_1 is distributed among capitalists and workers in the sector I, while in the sector II all the income produced is attributed to peasant proprietors. All the personal income distributed to the workers in the sector I and to the self-employees in the sector II will be consumed with no saving, and the capitalists will save all the profits they gain. Thus we have $Y_1-S=wN_1$, a definitional equation, where S and w stand for the amount of saving and wage rate, and wN_1+Y_2 is aggregate expenditure for consumption. All these quantities are measured in annual units to be consistent with the definition of labor unit. In these treatments, we have to ignore all the intermediate goods in order to avoid complexity. It may be, therefore, helpful to assume a constant ratio of net product to the gross product at least in the case of treating food production and agricultural income. Particular attention is paid for the ratio of food expenditure to the total consumption expenditure, which is denoted by f . This ratio is assumed constant for a certain range of per head income and is also assumed to have no difference between workers and self-employees. We do not intend to deny the well-known Engel's law, but merely want to represent the elastic demand for food with regards to the change in per head income of low levels (income elasticity=1.0), a fact which was revealed by several surveys about underdeveloped economies in Southeast Asia. We know that there is sometimes a significant difference of this ratio between urban workers and rural self-employees, but disregarding this difference may not be a serious misgiving for the purpose of this article.

Under these assumptions, we consider the conditions of equilibrium or balance as follows. First, in order to maintain a certain amount of capital stock (K), the capitalist is assumed to invest all the savings and the period of replacement (r) is assumed to be given by a relationship $K/r=S$. This is a greatest simplification of both the investment behaviour and the saving-investment equilibrium. Second, full employment is assumed, so that we have $N_1+N_2=N$, where N is the total number of labor force. We disregard differentials of both the wage rate (w) and the average productivity of labor or per head income in the sector II (Y_2/N_2). Therefore full employment means also no differentials of income in each sector. If there occurs some shortage of employment demand in the sector I, the residual labor force is assumed to be able to find jobs in the sector II without causing differentials of their income within this sector. Third, in the equilibrium state the wage in the sector I is equal to the average productivity in the sector II, that is $w=Y_2/Y_2$. This is a condition of fulfilling "income parity" in real terms. It goes without saying that this condition can permit us in giving certain allowances for the "differentials" of equilibrium income due to various non-economic factors, which operate differently between rural and urban lives. Fourth, it is of course necessary to balance demand for and supply of food, which balance is simply expressed as $(wN_1+Y_2)f=Y_2$. Lastly, an equation $\partial Y / \partial N = w$ is introduced as the condition of maximizing profit rate of capitalist in the sector I.

We define the economy to be at the stationary state of balanced equilibrium when

all the conditions above mentioned are fulfilled and there is no endogenous movement to change from this routine path. In order to check the possibility of reaching such a state, we build a simple model as follows:

Model I:

- 1) $Y_1 = F_1(K, N_1)$
- 2) $Y_2 = F_2(L, N_2)$
- 3) $K/r = S$
- 4) $Y_1 - S = wN_1$
- 5) $N_1 + N_2 = N$
- 6) $w = Y_2/N_2$
- 7) $Y_2 = f(wN_1 + Y_2)$
- 8) $\partial Y_1 / \partial N_1 = w$

The number of variables in this model is eleven ($Y_1, Y_2, N_1, N_2, N, K, L, r, S, w, f$). If we assume that the stock of land, the number of labor force and the ratio of food expenditure are given as constants ($L = \bar{L}, N = \bar{N}, f = \bar{f}$) this model will be consistently solved and we will be able to obtain an equilibrium distribution of labor force between the two sectors (N_1, N_2) that of output (Y_1, Y_2), and wage rate (w), saving (S), capital stock (K) and its period of replacement (r) in the sector I. As a matter of fact, the assumption of a fixed stock of land available to agriculture is almost accurate for most countries with already densely populated areas, and that of fixed ratio of food consumption expenditure may be permitted within a certain range of low income level as already touched upon. These are substantial assumptions, but the constant number of population is nothing but an artificial assumption for the sake of simple analysis. In this context, our system seems to be a stationary state of balanced equilibrium. The economic meaning of its mechanism can best be explained as follows.

Let us start with a certain amount of capital stock (K^*), an arbitrary choice, under the condition of a prevailing equilibrium wage rate (w , hereafter, no star notations will stand for equilibrium values). From the production function 1) and the profit rate-maximizing condition 8), the amount of employment (N_1^*) and the output (Y_1^*) for the sector I will be determined. The saving amount (S^*) and the replacement period (r^*) are to be fixed respectively from the definitional equation 4) and the equilibrium equation 3). On the other hand, the number of self-employees (N_2^*) will be obtained from the equation of full employment 5), and the amount of food output (Y_2^*) is to be determined accordingly from the production function 2). There remain two equations 6) and 7) still unused. We can obtain the amount of food demand from 7), using N_1^* , Y_2^* and K^* and w , which was summed at the very start. This amount of food demand is denoted by Y_2' . On the other hand, Y_2^* must be the amount of supply of food. There must be no balance between Y_2' and Y_2^* . Let us assume $Y_2' > Y_2^*$ or a state of over-demand. It is of course possible to consider an adjustment process toward an equilibrium by assuming an increase in the relative price of food, but this is not the process we would like to follow. The main reason for rejecting the role of price mechanism in this case is the recognized fact that in most underdeveloped countries the elasticities of food with regard to both supply and demand are very low so that the practical adjustment of disequilibrium state of supply and demand can only be effectively carried out by direct means of increasing supply or decreasing demand. Thus in our present case, we believe that the state of over-demand can best be adjusted

by eliminating the real cause, that is the over-existence of capital stock and in fact, this is proved as follows.

If K^* were larger than K , it follows $Y_1^* > N_1$. According to the assumed condition of decreasing return, $N_1^* > N_1$ is necessary by a larger degree than the above inequality. As for the sector II, $Y_2^* < Y_2$ is derived from $N_2^* < N_2$. The equation 7) thus leads to $Y_2' > Y_2^*$. This may be almost self-evident. We can say that the over-investment (this is corresponding to the over-existence of capital stock) will cause an increased demand for food on one hand and lead to a decreased supply of food on the other, thus resulting a disequilibrium of food balance. The reverse assumption will certainly lead us to a state of oversupply. Therefore between them there must be a certain amount of capital stock, which can exactly correspond to a state of supply-demand balance of food. In other words, this reveals a mechanism, where the food supply is a limiting factor to capital accumulation.

This is not the end of our story of the stationary state. There remains equation 6), the mechanism of which is to be explained. Usually the meaning of an equilibrium equation of this kind has simply been explained by assuming workers' direct behaviour of moving in and out between the two sectors, the incentive for which being assumed to be a magnitude of differentials of per head income to be received by them. The parameter of labor force movement is income differentials. This is not a mistake, but tells us only one side of the real working mechanism. The so-called "job opportunity" theory reveals the other side of the mechanism, which concerns the capitalist's behaviour. But this theory aptly disregards workers' behaviour. In our present case, the mechanism of labor movement can best be explained in the following way.

Contrary to the former case of starting arbitrary capital stock, let us assume first an arbitrary level of prevailing wage (w^+), under the state of capital stock of an equilibrium value (K). If the chosen wage rate is higher than the equilibrium one, namely $w^+ > w$, the production function tells us that N_1^+ will be smaller than the equilibrium number and this will lead to an inequality $N_2^+ > N_2$ for the sector II, according to the assumption of full employment. The overemployment in this sector will cause a lower average productivity, thus making a differential between the wage rate in the sector I and the per head income in the sector II. The existence of "cheaper" labor in the self-employed sector will give capitalist an incentive to expand his business and there will occur more "job opportunities" in the sector I and some of the self-employed will be hired in the sector I. This will cause a falling level of wages, which will continue to the point where the income differentials between the two sectors completely disappear, reaching the equilibrium wage rate. In the reverse case of $w^+ < w$, there is no difficulty of giving another explanation.

Thus we can give a fairly general explanation of the mechanism of our simple model without sacrificing any economic meaning of human behaviour. Of course, these two mechanisms caused by equations 6) and 7) should be understood simultaneously, affecting each other. The above explanations are obliged to be partial in order to avoid complexity.

III. Implications of our model for the theories of economic development

The implications of our model will be developed in relation to the theories of economic

development. I want to make clear in the discussions that follow the main differences between the well-known theories or concepts and ours.

First, it is to be noted that the concept of "subsistence level of living" or the like was not used in our model approach. The modern economics has often been obliged to borrow this vague concept from classical thought, when it has dealt with problems of the initial stage of economic development. It is of course desirable to avoid such a vague concept if possible. Some authors, myself included, proposed a more positive concept, for example, the average productivity of agriculture in the self-employed sector⁹. But in order to be logically consistent along these lines, we need a theory of subjective equilibrium of the farm-household, because under the given condition of production function, a certain level of average productivity must be determined as an equilibrium value. This is why such a device as marginal valuation curve of labor input has been tried. In our model, only a single condition of income parity was introduced, without elaborating specific conditions required for setting the behaviour equilibrium of farm-household, and we succeeded in giving a proof of the existence of "disguised equilibrium" *within* the general mechanism of the system.

This may appear, however, to be the same in principle as the classical explanation that an equilibrium wage rate is determined by the subsistence level. One may say that the only difference is a replacement of subsistence level by the average productivity of agricultural labor. This is not so. The basic difference can best be illustrated by the following. If the wage rate is *determined* directly by the level of Y_2/N_2 , we can build a simple branch model as follows:

Model Ia :

$$\begin{aligned} 1) \quad & Y_2 = F_2(\bar{L}, N_2) \\ 2) \quad & N_1 + N_2 = \bar{N} \\ 3) \quad & f = N_2/\bar{N} \end{aligned}$$

The equation 3) is a combination of 6) and 7) of Model I on the consideration of $w = Y_2/N_2$. In the model Ia, the variables are Y_2 , N_1 , N_2 , and these can be solved by these three relationships. It is to be noted that the two equilibrium conditions concerning food and labor force are fulfilled regardless of the amount of Y_2 and that Y_2 , N_1 , N_2 are all determined irrespective of other variables which appeared in Model I. Thus Model Ia gives a stationary state of equilibrium of the sector II, and this determines the wage level of the sector I. There is no room for the operation of the "marginal principle" and the "residual principle" of determining profit is definitely valid in this case. There is no doubt that the residual principle of determining profit is not inherent in the concept of subsistence level wages, but is inherent in the assumption of *self-determining mechanism* of sector II.¹⁰

⁹ See Lewis' paper op. cit., and K. Ohkawa, "Seikatsu suijun to sono sayo" (Standard of Living and its Function) in "Nihonkeizai no bunseki". (Analysis of the Japanese Economy) Vol. I, Tokyo, 1953. It should be admitted that if the major portion of land is cultivated by tenants the concept of subsistence level of living is not dispensed with in order to explain an equilibrium state. But we think the average productivity of owner-tillers can be taken as the standard in most real cases.

¹⁰ With regard to the effect of population increase, the classical thesis can be expressed in our system something like an equation $N_2 = F(Y_2/N_2 - A)$, where A stands for the subsistence level of living and subject to the condition $Y_2/N_2 \geq A$. If we put this equation into Model I, the system will give us an equilibrium value of N in a formal sense. But note that the assumption of constant N or of constant A does give us no substantial difference. By the way, note that it is possible to assume a given amount of K instead of N without altering the basic nature of Model I.

It seems to me that these principles and concepts of the traditional type often build implicitly the background of development policies and strategies for economic development of underdeveloped areas. Therefore, the implication of our model may shed some light not only on the theoretical problem but also on the practical issues involved in this respect. What we made clear in the foregoing discussion is the point that it may not be wise to assume a certain level of subsistence more or less rigidly, without taking into account the productivity effect both in the capitalistic sector and the self-employed sector.

Second, our discussion will bring about some challenge both to the doctrine of unlimited supply of labor and the concept of disguised unemployment, with regards to development policies. Among the latter, Nurkse's formulation may be a typical one. It is quite open and free to assume that the marginal productivity of labor is zero or nearly zero at the stationary state of our model. But I have doubt about such an assumption as far as the development strategy is concerned, because of two reasons. First, the marginal productivity of labor in reality may not be so small and the reduction of labor force in agriculture will eventually bring about trouble, reducing food production, so long as the production method and organization remain unchanged.¹¹ Second, in reality of initial economic development, the supply of labor will be increased by the natural increase of population, so that the key problem is not the possible reduction of the present number of the rural population, but how to utilize the newcomer to the labor market.

In order to increase food output, the shift of agricultural production function is a pre-requisite, because without improvement of productivity, even by simple methods, one can not expect an increase of food supply. Without an increase of food supply, there can be no increase of labor availability in sector I.

Let us suppose that the production function F_1 had an upward shift in our model. Y_1 will become larger. The capital accumulation would be accelerated, because of a larger S with unchanged w and N_1 . It still needs, however, the same number of labor force (N_2) to produce food, if there is no upward shift of production function F_2 . No labor force can be released from sector II. Therefore a tendency to increase capital intensity is inevitable and this will reach sooner or later again a stationary state. This gives another explanation why the technical progress of food production is called "pre-requisite" or "pre-condition" for economic development at the initial stage.

The doctrine of unlimited supply of labor seems not entirely depend upon the existence of disguised unemployment. A. Lewis' formulation of this concept is careful. However, it still seems to have a common doubtful background with the concept of disguised unemployment in the sense that the hypothesis of "unlimited supply" is generally built, irrespective of the possible increase of food supply. Lewis rightly touched upon the importance of food supply, but he failed to integrate this point into his whole system. Our model revealed the relationships that the possible supply of labor from the sector II to the sector I is "limited" by several conditions, the given number of labor force, the given production function and the given ratio of food consumption expenditure. In order to create an unlimited supply of labor in the sense that the demand price of labor proposed by capital-

¹¹ In this respect, I agree with Rao's opinion. See, V.K.R.V. Rao, "Investment, Income and the Multiplier in an Underdeveloped Economy", *The Indian Economic Review*, February 1953. During World War I, Japan's agriculture experienced a shortage of labor because of a moderately accelerated increase in the out-flow of rural labor force to the prosperous urban industries.

ists is always higher than the supply price of labor in the sector II, we certainly need an important assumption that the rate of increase of capital formation is always smaller than that of labor force. This again requires an explanation of why this is so.

I wonder that there may be three stages of economic development. At the first stage economic development is "limited by food supply" because the supply of labor is limited by food supply. At the second stage, "unlimited supply" of labor will really come into force because of a possible emancipation from the "limited supply" of food. Toward the third stage the supply of labor will again become "limited" because of the relatively decelerated rate of population growth. I think that the doctrine of unlimited supply of labor is useful in explaining the cause of high rate of growth in a country like Japan, which is just at the second stage of economic development, but it is not useful and sometimes even misleading, when applied to the case of underdeveloped economies, where land resources are limited because of a dense population.

Third, we want to pay a particular attention to the existence of the two conflicting forces which are necessarily caused by the progress of agricultural techniques. The progress of productivity will certainly contribute to increasing food supply and accordingly will accelerate the rate of capital accumulation, if other conditions remain unchanged. However, on the other hand, it also leads to a higher income for both workers and the self-employed under equilibrium conditions. If we apply a method of comparative statics to Model I, this fact will be apparent. This effect, contrary to the above effect, will certainly operate as a brake to capital accumulation. Therefore, the "output effect" and the "income effect" are destined to be conflicting to each other.

A. Lewis has drawn attention to this dual effect from the standpoint of changes in terms of trade between industry and agriculture. We try to explain it by using our model in terms of technical progress.

Let us suppose that the production function F_2 had a shift upward as a result of technical progress of agricultural production. This will be followed by an upward shift of average productivity of agriculture and that of the wage level. Since there can be no change in the number of N_2 due to the assumption of constant f , saving must decrease as a result of wage increase, and this will lead to a smaller rate of capital accumulation. In reality, the assumption of constant ratio of food expenditure is too rigid, and if we replace it by a constant elasticity of food demand with regard to income increase (η), then the income effect of technical progress will be expressed in a more elastic way. Suppose η is 0.7 (I think this is more or less close to the real figures in most countries in Southeast Asia), the residual 0.3 does represent the output effect. The number of agricultural labor force can be reduced accordingly to this extent. In the case of 0.5, both effects are even, but we can not expect such a low value for underdeveloped stage.

This simple illustration gives us an explanation why the capitalists are not necessarily serious in encouraging technical progress of agriculture. It is self-evident that without increasing food output, capitalist sector must remain in a stationary state. On the other hand, however, the results of raising agricultural output act against capital accumulation by increasing income much more than output. Landlords sometimes play an intermediary role between capitalists and peasants in lessening the income effect. We had such an example in the early stage of economic development in Japan. Any way, this is one of the real difficulties for the strategy of economic development, because foreign trade can

not be an easy substitute for an increasing supply of food.¹²

IV. A process of balanced growth

Starting from the stationary state of Model I, I would like to give a simple growth model. Both technical progress and increase in population are taken into consideration, and the income elasticity of food demand (η) is introduced. All the other variables are given time element (t) and are denoted like $N(t) = N(0) e^{\lambda t}$, where λ stands for the rate of increase of labor force population. The production functions F_1 and F_2 are given shift variables α_1 and α_2 respectively. I am aware of an increased importance of the capital and investment in agriculture in discussing a growth model, particularly in relation to the technical progress in this sector. For the sake of simplicity, however, the non-capital assumption is still kept for this sector.

Model II :

- 1) $Y_1(t) = F_1[(K(t), N_1(t))] + \alpha_1(t)$
- 2) $Y_2(t) = F_2[L(t), N_2(t)] + \alpha_2(t)$
- 3) $S(t) = dK/dt$
- 4) $w(t)N_1(t) = Y_1(t) - S(t)$
- 5) $N_1(t) + N_2(t) = N(t)$
- 6) $w(t) = Y_2(t)/N_2(t)$
- 7) $G_2 = \eta w + \lambda$
- 8) $\frac{\partial Y_1}{\partial N_1}(t) = w(t),$

where $G_2 = \frac{dY^2}{dt} \cdot \frac{1}{Y_2(t)}$ and $w = \frac{dw}{dt} \cdot \frac{1}{w(t)}$.

The variables are Y_1 , Y_2 , N_1 , N_2 , K , L , w , S , η , λ , α_1 , α_2 , totaling 12. In order to arrive at a consistent solution of this model, we have to give four more relationships or variables from outside. It may be most natural and practical to assume a constant stock of land ($L = \bar{L}$), a constant rate of population increase ($\bar{\lambda}$) and a constant income elasticity of food demand ($\bar{\eta}$). In addition to these three, if we introduce another exogenous factor with regard to one of the technical shift variables, then we can solve this system. The five equilibrium conditions—3), 5), 6), 7), 8) will be fulfilled continuously in the course of growth. This can be a process of balanced growth equilibrium at least in a formal sense.¹³

A special attention, however, is required to the shift variables of production functions in both sectors. The technical progress or the flow of technical knowledge has usually been considered to be given from outside the economic system. In our case, however, one of the two shift variables is to be determined within the system, if a balanced growth has to be maintained. Of course we have no empirical evidence for determining which is

¹² We should be careful not to make a too-much generalization in this respect. There are rice exporting countries like Thailand and Burma, in which the man-land ratio are relatively favourable by the standards of Southeast Asia.

¹³ Mitsuharu Inage's model is an excellent suggestion for us in this respect, though his conclusion is not the same as mine. See his paper "Keizai Seicho to Nogyo" (Economic Growth and Agriculture), *Keizai Kenkyu* (The Economic Review) Vol. 12, No.1, January 1961.

exogenous or endogenous of the two shift variables. However, as far as the spontaneous nature of technical innovations is concerned, it may be natural to assume that the shift variable of the capitalist sector (α_1) is responsible. If this is taken for granted, a balanced growth can be expected only when α_1 is given. In this case another condition is still required that α_2 can be adjusted to meet the conditions of balanced growth.

In this respect a few words on a possibility of maintaining balanced growth paths will be needed from the viewpoint of agricultural policy. In most countries, the government plays an important role in encouraging technical progress of agriculture, and in particular, in the countries where peasant economy is dominant in agriculture, this is of strategic importance for economic development. Suppose that the shift variable of production function in the sector I is given or projected. The government's policy can be expected to lead the rate of technical progress in the sector II in order to make approximation to a balanced growth, of which the balance in which we are most interested is the maintenance of income parity between the self-employed in agriculture and the workers in the capitalist sector. Such an interpretation, however, will change the nature of our model and we should call it a *policy model* in this context. But it is to be noted that the policy model of this kind is backed up with the proved existence of a balanced growth.

The nature of technical progress thus required under the condition of constant stock of land available to agriculture must be land-saving. If the number of labor force in agriculture is assumed to be kept unchanged throughout the growth process as in Japan's historical experience, it should be also labor-saving by the same degree. If that number is to be decreased in order to accelerate the supply of labor to the capitalistic sector, the improvement of agricultural technique should be more labor-saving than in the former case. Suppose that α_2^* represents such a rate of technical progress under the condition of constant labor force in the sector II (this is assumed for simplicity), from equation 2) we can get a very simple relationship $G_2 = \alpha_2^*$, and from equation 7) we can obtain another simple equation $\alpha_2^* = \lambda(1 - \eta)$, considering $\omega = G_2$, the condition of maintaining "disguised equilibrium".

In this context, the problem of transition from the second to the third stage of economic development requires particular attention. Unlike the first and second stage, this transition process requires a reduction of labor force from sector II, because the rate of increase in the labor force is to be assumed slowed down while the rate of capital accumulation has to be accelerated by absorbing the self-employed labor force hitherto occupied in sector II. It is worthwhile to elaborate the nature of the agricultural production function here. An increase of output combined with a decrease of labor is required at the stage under consideration, apart from depending on a larger amount of food import. As far as the usual static production analysis is concerned, an increase of output combined with a decrease of labor means a pre-existence of a minus marginal productivity of labor. This interpretation, however, is not valid in our case. In our Models I and II we discussed the production functions in quite a general form throughout the whole process. During long-run economic growth, however, the agricultural production function must have significant changes due to the improvement of the farmer's management ability as well as of his desire to expand. During the first stage of economic development, because of the low level of these qualifications, a decrease of labor in agriculture would cause a decrease of total output, labor productivity being kept unchanged. In other words, we can not expect the economies

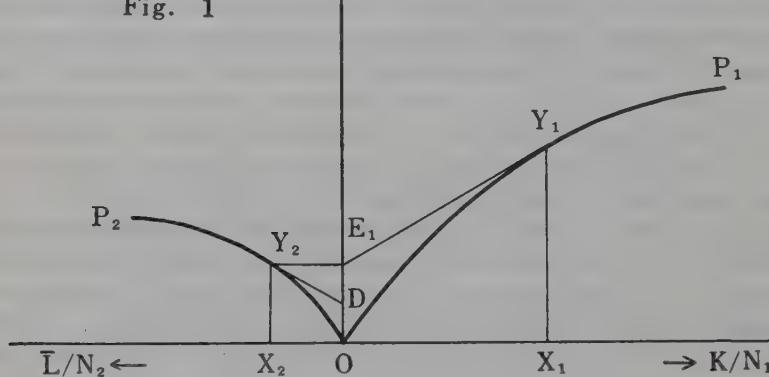
of scale at such a stage. Towards the later stage, however, economies of scale can come to be considered even in sector II.

Thus we take up a particular form of production function (productivity function) as follows:

$$\frac{Y_2}{N_2} = P_2 \left(\frac{\bar{L}}{N_2} \right), P_2' > 0, P_2'' < 0. \quad \frac{Y_1}{N_1} = P_1 \left(\frac{K}{N_1} \right), P_1' > 0, P_1'' < 0.$$

Fig. 1 may serve to illustrate the nature of this form of productivity function of agriculture in relation to its counterpart in the capitalist sector.

Fig. 1

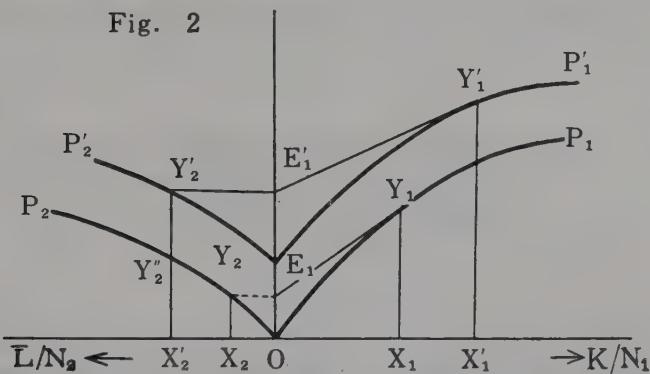


On the horizontal axis from the origin K/N_1 is measured to the right of the origin and \bar{L}/N_2 to the left. Suppose that at a certain period, K/N_1 is at X_1 and L/N_2 at X_2 . On the vertical axis the productivity is measured. Suppose that the average productivity in the sector I is $X_1 Y_1$, and that of the sector II, $X_2 Y_2$ at the period above mentioned. A straight line tangential to P_1 at Y_1 determines a point E_1 and OE_1 gives the marginal productivity of labor in the sector I. Likewise we get OD for sector II. $X_1 Y_1 > X_2 Y_2$ and $OE_1 > OD$ because of the basic assumption of our two-sector model.

The condition of maximizing the rate of profit will be satisfied when OE_1 is equal to the prevailing wage. The condition of disguised equilibrium will be satisfied if $X_2 Y_2$ (or OE_1) is equal to the prevailing wage. We can suppose that an equilibrium wage determined by Model II satisfies these conditions at the same time.

Next Fig. 2 gives an illustration of a growth process with shifts of productivity functions, from P_1 to P'_1 and from P_2 to P'_2 . Let us first suppose a change of an increase of K/N_1 combined with an increase of N_1 in the sector I as a result of labor force shift from the sector II. This is shown by a shift from X_1 to X'_1 on the horizontal axis. In this case the marginal productivity of labor $OE_1 \rightarrow OE'_1$ and the demand wage rate will be increased. But if the productivity function in the sector II remains unchanged, two unbalances will occur. One is the disparity of income, and the other the unbalance of demand and supply of food. The average productivity can increase from $X_2 Y_2$ to $X'_2 Y''_2$ as a result of reducing the number of labor force, but not enough to be equal to OE'_1 , so that a shift from P_2 to P'_2 is needed in order to reach $X'_2 Y''_2 = OE'_1$. The shift of agricultural

Fig. 2



production function of this kind was the case in the previous discussion of the policy model.¹⁴ We can not be sure that such a specific shift as illustrated here will meet the food balance condition. This balance is to be given by the whole system of Model II. What we can say by this illustration is that at this stage the food supply can be increased concurrently with a reduction of labor force in agriculture.

¹⁴ Here we are obliged to assume a "neutral" technical progress because of the fact that we already introduced shift variables in Model II. This is done merely for simplifying the explanation. This assumption is of course not necessary for keeping a balanced equilibrium of the system.

LABOR, CAPITAL AND LAND IN ECONOMIC GROWTH

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I. Introduction

At the early stage of development in current theories of economic growth, the role of capital has received the greatest attention.¹ However, if we grant enough time for capitalists to rearrange their production methods, labor must also be taken into consideration, because labor can substitute for capital in producing a given level of output. Recently many objections have been raised against the postulate of fixed capital coefficient and the importance of variable factor ratio has grown.²

The purpose of this paper is to investigate the process of economic growth from the standpoint of marginal productivity principle. As productive factors, we shall take not only capital and labor, but also land or natural resources. By introducing the element of land into the system, we can apply our economic model effectively to the analysis of the Ricardian theory of economic growth.³ In particular this should shed light on how types and properties of innovations are influenced also by the existence of land. Throughout this paper we shall always keep our attentions on the mechanism of income distribution, that is on the problem which was Ricardo's fundamental concern.

II. Simplified Model

In the following, we shall pose an economy composed of three social classes, namely laborers, capitalists and landowners, and assume that capitalists are identified with entrepreneurs. We assume also that, neglecting the time span required for sale of output, factor costs to laborers and landowners are paid at the end of the production period. This latter assumption enables us to eliminate the cost of payments to laborers and land-owners from the amount of capital to be advanced. Further we shall leave aside the problem of relative prices, and assume that there exists a general price level for commodities and it

The author is indebted to Professor W. Fellner, of the Yale University, for his helpful criticism and continuing encouragement. Any deficiencies remaining in this paper are, however, the sole responsibility of the author.

¹ R. F. Harrod, Towards a Dynamic Economics, 1948. E. D. Domar, Essays in the Theory of Economic Growth, 1957.

² For example, see W. Fellner, Trends and Cycles in Economic Activity, 1956, p. 143-145.

³ This is perhaps one of the neglected problems in Harrod's growth economics. Harrod says, "I propose to discard the law of diminishing returns from the land as a primary determinant in a progressive economy" (R. F. Harrod, *ibid.*, p. 20).

is always unitary. To make matters more manageable, we have to add further that labor and land perfectly homogeneous, and that labor is measured in terms of the number of workers and land in terms of acre. Lastly it should be remembered that, unless a special reference is made, all the magnitudes used in what follows are measured in terms of an unproduction period.

Under these simplified assumptions, we define *labor productivity* as the net output per laborer produced per production period. Denoting the net output with Y and the number of the employed workers with N , labor productivity is shown simply with $\frac{Y}{N}$. Following the traditional manning productivity principle, let us put the following propositions:

(1) Other things being equal, labor productivity rises as the land per laborer increases, but at a decreasing rate.

Let us call the land per laborer simply *land intensity* and denote it with $\frac{L}{N}$ where L is the land rented per period. Thus this proposition tells us that, if other things are equal, labor productivity is an increasing function of land intensity at a diminishing rate.

(2) Other things being equal, labor productivity rises as the capital to be advanced on the average per laborer increases, but at a decreasing rate.

Following the traditional definition, let us call the capital to be advanced on the average per laborer simply *capital intensity* and denote it with $\frac{K}{N}$, where K is the average amount of capital to be advanced in a production period. This is one of the fundamental propositions in traditional capital theory,⁴ and its validity can be testified only by the observation of reality, just as in the case of the former proposition. From this proposition, we may say again that labor productivity is *cet. parib.* an increasing function of capital intensity at a diminishing rate.

Owing to these two propositions, the following functional relationship can be presented between labor productivity, capital intensity and land intensity:

$$\frac{Y}{N} = F\left(\frac{K}{N}, \frac{L}{N}\right)$$

In the following, we call this F -function the labor productivity function or shortly the *productivity function*.

In order to simplify notations, it will be convenient to write as follows:

$$y = \frac{Y}{N} = \text{labor productivity}$$

$$k = \frac{K}{N} = \text{capital intensity}$$

$$l = \frac{L}{N} = \text{land intensity.}$$

Thus the labor productivity function can be rewritten as

$$y = F(k, l).$$

For the sake of simplicity, if we assume that this is infinitely continuous and differentiable,

⁴ Especially this proposition has been dwelt on in the exposition of Böhm-Bawerk in connection with the time-using character of highly mechanized production. Böhm-Bawerk, The Positive Theory of Capital (English trans., 1891).

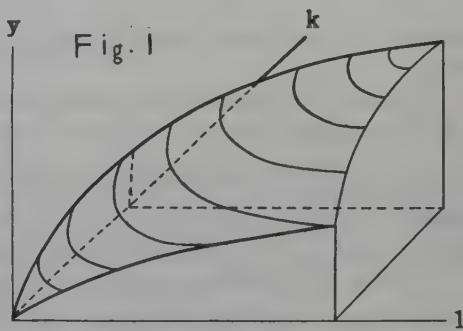
then the following properties are obvious from our propositions:

$$\frac{\partial y}{\partial k} > 0, \quad \frac{\partial^2 y}{\partial k^2} < 0,$$

$$\frac{\partial y}{\partial l} > 0, \quad \frac{\partial^2 y}{\partial l^2} < 0,$$

With these properties in mind, we can immediately draw a diagram as in Fig.1. As is clear, the contours on the y -surface are shaped such that they are down-ward sloping and convex to the origin. This is the principle of the "increasing marginal rate of substitution" between capital and labor.

Our first problem is to ask the economic implication of any given point on the y -surface, particularly its implication in the mechanism of income distribution. We shall next discuss in what direction such a given point on the y -surface moves in the course of economic growth and also its implication in the dynamic mechanism of income distribution. The analysis of technical progress, particularly its impact on income distribution and demand for factors will be made in the last chapter.



III. Income Distribution under Constant Factor Ratios

For the time being, we shall maintain the assumption of static condition in the sense that both capital and land intensities are kept constant. As will be seen later, this does not necessarily mean that labor, capital and land are all constant in their magnitudes. The only thing implied here is that the growth rates of labor, capital and land are the same.

Under free competition, capitalists are assumed to employ the most profitable method of production which realizes the maximum rate of profit. As the rate of profit is derived by subtracting the (contract) payments to laborers and land-owners from the net output and dividing it by the capital value to be advanced per period on the average, the rate of profit is given by

$$\frac{Y - wN - rL}{K} = \frac{Y - wN - rL}{N} / \frac{K}{N} = \frac{y - w - rl}{k}$$

where w is the wage rate per laborer and r the rate of rent per acre of land.

Under the given productivity function, capitalists have to form two decisions as to the "scale of production". Firstly, they have to adopt that method of production which makes capital intensity realize a maximum rate of profit. This condition is obtained by a partial differentiation of the rate of profit with respect to capital intensity and making it zero, namely

$$\frac{\partial}{\partial k} \left(\frac{y - w - rl}{k} \right) = \frac{\frac{\partial y}{\partial k} k - (y - w - rl)}{k^2} = 0$$

$$\therefore y = \frac{\partial y}{\partial k} k + rl + w.$$

Secondly they must adopt that land intensity which realises the maximum rate of profit.⁵ In the same way as capital intensity, this condition is given by the following equation,

$$\begin{aligned}\frac{\partial}{\partial l} \left(\frac{y - w - rl}{k} \right) &= \frac{rk - \frac{\partial y}{\partial l} k}{k^2} = 0 \\ \therefore r &= \frac{\partial y}{\partial l}.^6\end{aligned}$$

In the following, we assume that supplies of labor and land are infinitely inelastic with respect to the wage rate and rate of rent respectively. This means that laborers or land-owners are ready to accept any level of wage rates or rates of rent until full employment of labor or land is attained. We can of course pose the problem differently. For instance, we can assume, if we want, that a certain level of real wages is given or predetermined by a trade union. If this is the case, the problem is to ask the number of workers to be employed under the given wage rate. Which way the problem is to be posed is of course dependent on the question to be solved. It should be kept in mind, however, that as far as it is within a competitive capitalist economy, suppliers of productive factors cannot as a rule, claim to determine both the level of factor prices and the magnitudes to be employed simultaneously.

As N and L are given at factor markets on the one hand, and K are also given in the hands of capitalists on the other, both capital and land intensities to be chosen are also given from the beginning, because we are assuming the full employment of these factors. Then our economic system under the maximum rate of profit becomes as follows:

$$(1.1) \quad y = F(k, l)$$

$$(1.2) \quad y = \frac{\partial y}{\partial k} k + rl + w$$

$$(1.3) \quad r = \frac{\partial y}{\partial l}$$

$$(1.4) \quad k = \bar{k}$$

$$(1.5) \quad l = \bar{l},$$

where \bar{k} and \bar{l} denote respectively the capital intensity and land intensity under the full employment of labor, capital and land. Since there are five equations to determine five

⁵ In the literature of traditional capital theory, this second decision has been seldom discussed. Wicksell, however, gave due consideration to this problem. K. Wicksell, Lectures on Political Economy, Vol. 1 (English Ed. 1934), p. 181.

⁶ It should be kept in mind that the real value of capital intensity does not depend on the level of real wage rate (and also rate of rent), because K does not include the payments to factor costs by assumption. Therefore there does not arise the complicated problem with which Mrs. Robinson has met, i.e. shiftability of productivity function owing to changes in real wage rates (and real rates of rent). J. Robinson, The Accumulation of Capital, 1956. The identification of capitalists with entrepreneurs also excludes the dependence of capital intensity on the rates of interest.

variables y , k , l , w and r , our system is completely determined.⁷

The interpretation of this system is quite clear and easy. From (1.4) and (1.5), we can determine k and l . Substituting them into (1.1), y is also determined. Let us call it \bar{y} . As y , k and l are all known, we can also determine the value of derivatives in (1.2) and (1.3). Therefore, we can determine r from (1.3). Substituting it into (1.2), we can finally determine w . Thus we can determine all the variables uniquely.

What is then the economic meaning of derivatives $\frac{\partial y}{\partial k}$ and $\frac{\partial y}{\partial l}$? In order to answer this question, it is necessary to notice the following fact. From (1.1) we can derive

$$y \cdot N = \frac{Y}{N} \cdot N = Y = F(k, l) \cdot N = Y(K, L, N).^8$$

Let us multiply K , L and N respectively by the same positive number g . If Y is also increased by g times, then we say that the Y -function is homogeneous of the first degree. However, it is clear that k and l do not change by this multiplication, so that y also does not change. Thus, owing to this multiplication, Y is increased by g times, because F does not change and only N is increased by g times. Therefore, the Y -function is proved to be homogeneous of the first degree.

By the well known Euler theorem on homogeneous functions,⁹ we can derive again

$$Y = \frac{\partial Y}{\partial K}K + \frac{\partial Y}{\partial L}L + \frac{\partial Y}{\partial N}N.$$

As long as the productivity function (1.1) is valid, this last equation is necessarily true under any circumstance. However, as will be clear immediately, each derivative on the right side of this equation is no more than the marginal productivity of capital, land and labor. This is shown as follows.

Under the condition of the maximum rate of profit, we have

$$\begin{aligned}\frac{\partial Y}{\partial K} &= \frac{\partial}{\partial K}(y \cdot N) = \frac{\partial y}{\partial k} \frac{\partial}{\partial K}\left(\frac{K}{N}\right) \cdot N = -\frac{\partial y}{\partial k} \\ \frac{\partial Y}{\partial L} &= \frac{\partial}{\partial L}(y \cdot N) = \frac{\partial y}{\partial l} \frac{\partial}{\partial L}\left(\frac{L}{N}\right) \cdot N = -\frac{\partial y}{\partial l} \\ \frac{\partial Y}{\partial N} &= \frac{\partial}{\partial N}(y \cdot N) = y + \frac{\partial F}{\partial N}N = y - \frac{\partial y}{\partial k}k - \frac{\partial y}{\partial l}l - w.\end{aligned}$$

Thus, we can prove that the derivatives of productivity function with respect to capital and land intensities are respectively equal to the marginal productivity of capital and land and that the marginal productivity of labor is equal to the real wage rate. It has also been proved that there is no discrepancy in value between production and distribution in the sense that if each factor receives their remuneration according to their marginal

⁷ As mentioned above, we can put the following equations instead of (1.4) and (1.5),

(1.4)* $w = \bar{w}$

(1.5)* $r = \bar{r}$.

Again, remember that there is no assurance of compatibility of such fixed \bar{w} and \bar{r} with the full employment of labor and land in the condition of the maximum rate of profit.

⁸ $Y = Y(K, L, N)$ is sometimes called *production function* in modern economics.

⁹ R. G. D. Allen, Mathematical Analysis for Economists, 1938, p. 317.

productivities, the whole net output is distributed to the production factors without residuals.¹⁰

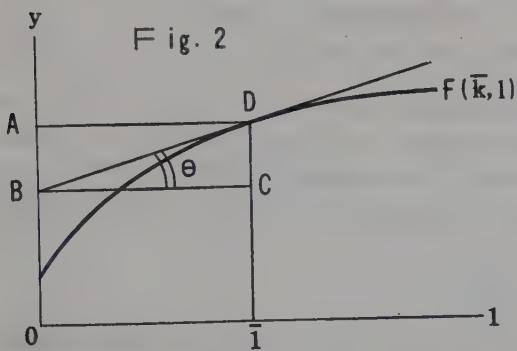


Fig.2 is intended to show the relationship between labor productivity and land intensity with capital intensity given at \bar{k} . If land intensity is also given at \bar{l} , then the tangent θ at this point on the curve $F(k, l)$ shows the rate of rent to be paid to land-owners. As (1.3) says, this tangent is nothing but the marginal productivity of land. Since the rate of rent is given by this tangent, the relative share of land-owners among the net output per laborer is given by AB , because

$$\frac{\partial y}{\partial l} l = \frac{DC}{BC} BC = DC = AB.$$

Since OA is the labor productivity under the given \bar{k} and \bar{l} , and since AB is the land-owner's relative share, $OA = AB = OB$ is the joint income of laborers and capitalists in the labor productivity. Therefore we have

$$\frac{\partial y}{\partial k} k + w = OB.$$

As is clear, the lower the land intensity, the higher the rate of rent and the smaller the joint income of laborers and capitalists.

In the same way, we can derive a diagram which shows the functional relationship between labor productivity and capital intensity with land intensity given. But this task will be left to the readers.

In order to see the mechanism of income distribution under the constant factor ratios more minutely, let us define the elasticities of productivity function with respect to capital and land intensities respectively as follows:

$$E_k = \frac{\partial y}{\partial k} / \frac{y}{k}$$

$$E_l = \frac{\partial y}{\partial l} / \frac{y}{l}.$$

From the equation (1.2), we can derive the equation

$$\frac{y - rl - w}{y} = \frac{\partial y}{\partial k} \frac{k}{y} = \frac{\partial y}{\partial k} / \frac{y}{k} = E_k.$$

The left side of this equation is again rewritten as follows:

$$\frac{y - rl - w}{y} = \frac{Y - rL - wN}{Y}.$$

Since $(Y - rL - wN)$ is the total profits of capitalists, this last expression denotes the relative

¹⁰ This is perhaps one of solutions to what we call "adding-up-problem" or imputation problem in distribution theory of income which has been so much discussed.

share of profit in the net output. We can say therefore that under the condition of maximum rate of profit, the relationship

relative share = elasticity of productivity function
of profit = with respect to capital intensity

must prevail.¹¹

In the same way, we can establish the relationship

relative share of rent = elasticity of productivity function with respect to land intensity

under the condition of maximum rate of profit, but this derivation will be left again to the readers.

For obvious reasons, E_k and E_l are less than one. Let

$$E = E_k + E_l$$

If there should be a positive share Indeed, from (1.2), we can have

$$\therefore y = \frac{1}{1-E}w.$$

As both y and w are positive, it follows that E must necessarily be less than one. We shall use this last formula when we discuss the problem of stationary state in the Classical School.

IV. Process of Economic Growth under Changing Factor Ratios

So far we have been concerned only with the case of constant factor ratios. Under the condition of full employment of factors, this is feasible when labor, capital and land are all growing at the same rate.

Let us denote the capital and land intensities in the first period with k_1 and l_1 and those in the second period with k_2 and l_2 . Further we denote the growth rates of these two ratios with G_k and G_l , namely

$$G_k = \frac{k_2 - k_1}{k_1} \text{ and } G_1 = \frac{l_2 - l_1}{l_1}.$$

Using these notations, the assumption in the previous chapter is simply $G_k = G_l = 0$. If G_k is positive, this means that, under the full employment of factors, capital grows faster than labor, and if G_l is positive, it is that land increases faster than labor. If labor grows and land is held constant, G_l becomes negative, as in the case of Ricardo. Of course, we cannot say anything about the relative movements of these magnitudes *a priori*. In

¹¹ This relationship is equal to Fellner's equation

$$\frac{P}{O} = \frac{P}{V} \Big/ \frac{O}{V}$$

where O is total output, P interest-plus-profit income and V total capital stock, because Ek is equal to the product of profit rate and the average productivity of capital. W. Fellner, *ibid.*, p. 122, Footnote 12.

particular it will be difficult to tell infallibly about the relative growth rates of labor and land. Admitting many possibilities of relative growth rates of factors, we try to formulate the Ricardian version of economic growth, and throw some light on the concept of the classical stationary state.

Before proceeding, let us make some assumption on the shape of productivity function. As was proved, the relative share of profit or rent in the net output is equal to the elasticities of productivity function with respect to capital intensity or land intensity. Then, how will these elasticities change as a consequence of changes in these intensities? They may sometimes increase and sometimes decline. For the sake of simplicity, however, and particularly for the sake of quantitative qualification, we assume that, so long as the knowledge of alternative methods of production is constantly given, they are always constant. This amounts to saying that the relative shares in the net output remain unchanged under any factor ratio. Thus we may set up as

$$E_k = \text{constant} \quad \text{and} \quad E_l = \text{constant}.$$

It should be remembered that this assumption does not insist on the constant remuneration to each factors. What is meant here is simply that the marginal productivity of a factor changes proportionally to the changes in its average productivity, so that the ratio of marginal productivity of the factor to its average productivity does not change under changing factor ratios.

From this assumption, it follows that the productivity function (1.1) is homogeneous of degree $E = E_k + E_l$.¹² For obvious reasons, total elasticity E is smaller than one. Some important economic consequences follow from this property immediately. They are that if capital and land intensities grow at the same rate, namely if $G_k = G_l > 0$, (1) the ratio of profit rate to rate of rent does not change, but (2) the absolute level of both rates declines gradually.

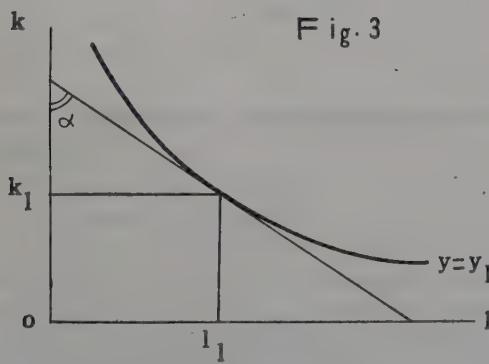


Fig. 3

In Fig. 3, let us assume that capital intensity is given at k_1 and land intensity at l_1 . Let us call the resulting labor productivity y_1 , and denote a contour curve $y=y_1$ on this plane. Now, differentiating the equation (1.1) totally, we have

$$dy = \frac{\partial y}{\partial k} dk + \frac{\partial y}{\partial l} dl.$$

If this equation is applied to the contour curve $y=y_1$, it follows

$$\frac{\partial y_1}{\partial k_1} dk_1 + \frac{\partial y_1}{\partial l_1} dl_1 = 0.$$

¹² The proof os as follows. As E_k and E_l are constantly given, it follows

$$\frac{dy}{y} = E_k \frac{dk}{k} + E_l \frac{dl}{l}$$

Integrating this, we have again

$$\begin{aligned} \log y &= \log A + E_k \log k + E_l \log l \\ \therefore y &= A k^{E_k} l^{E_l}, \end{aligned}$$

where A is a parameter. Needless to say, this last equation is a homogeneous function of degree $E_k + E_l$.

From this we have again

$$\frac{\partial y_1}{\partial k_1} / \frac{\partial y}{\partial l} = -\frac{dl_1}{dk_1}.$$

This last equation shows the marginal rate of substitution of capital for land. It follows therefore that the tangent α in this figure is equal to the ratio of profit rate to rate of rent, namely

$$\text{tangent } \alpha = \frac{\text{rate of profit}}{\text{rate of rent}}$$

Substituting E_k and E_l into the above equation, we have

$$\frac{dk_1}{k_1} / \frac{dl_1}{l_1} = \frac{E_l}{E_k} = \sigma$$

As is well known, this last expression is the elasticity of substitution of capital for land. Being E_k and E_l supposed to be constant by our assumption, this elasticity of substitution between capital and land is also constantly given.

In Fig.4, let us suppose that a pair of k_2 and l_2 is also located. The tangent α at the point S is equal to the ratio of profit rate to rate of rent. However, we can show again that, under the assumed conditions, the tangent β at the point T is equal to the tangent α .

Since the elasticity of substitution of capital for land is constantly given, we have

$$\begin{aligned} \sigma &= \frac{E_l}{E_k} = -\frac{dk_1}{k_1} / \frac{dl_1}{l_1} = -\frac{dk_2}{k_2} / \frac{dl_2}{l_2} \\ \therefore \quad \frac{dk_1}{dl_1} / \frac{k_1}{l_1} &= \frac{dk_2}{dl_2} / \frac{k_2}{l_2}. \end{aligned}$$

Since both pairs of k and l are on the same radius through the origin, it follows

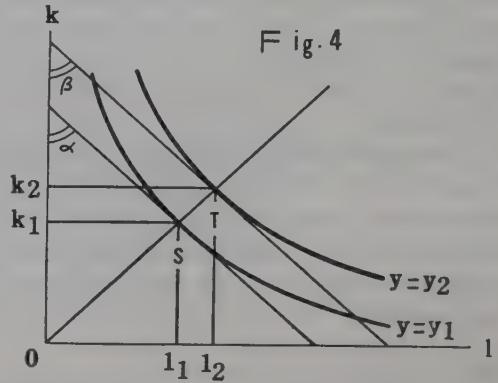
$$\frac{k_1}{l_1} = \frac{k_2}{l_2}.$$

Thus we have finally

$$\frac{dk_1}{dl_1} = \frac{dk_2}{dl_2} = \text{tangent } \alpha = \text{tangent } \beta.¹³$$

The second consequence that the absolute level itself declines is proved as follows. Let the point S in Fig.4 be moved to the point T . As far as the total elasticity E is less than one, the resulting labor productivity is less than capital intensity or land intensity in terms of growth rate. Since capital intensity or land intensity has increased more than labor productivity, the average productivity of capital or land must decline. So long as E_k and E_l are constantly given, the decline of the average productivity means the decline

¹³ As is immediately clear, this conclusion is not confined to a special case, but any radius through the origin O cuts the curves in points where the tangents are parallel. Therefore, our conclusion is quite general.



of its marginal productivity, so that profit rate or rate of rent must decline absolutely.

It should be kept in mind, however, that this does not imply that profit rates or rates of rent must decline on evry point on a given contour curve $y=y_2$, as compared with a

point S on $y=y_1$. Let us compare the point S , for example, with the point U in Fig. 5. The point U denotes a position such that a higher labor productivity is attained by increasing capital intensity with land intensity given. Clearly the average productivity of land is increased, so that the marginal productivity of land or rate of rent is also increased because E_l is constant. We know that rate of rent is decreased at the point T and increased at the point U , as compared with the point S . As far as the productivity function is continuous, there must exist a point V such that the rate of rent coincides with each other.

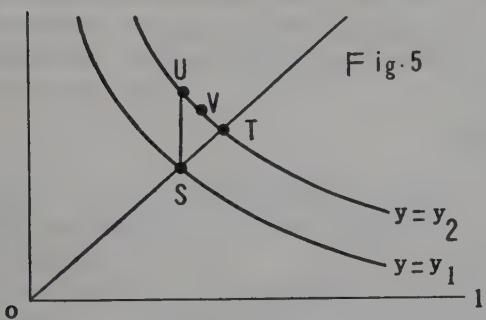


Fig. 5

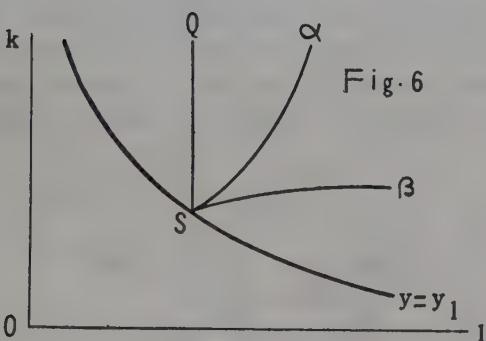


Fig. 6

both the average and marginal productivity of land increases proportionally to labor productivity.

Mutatis mutandis, the same analysis may be applied also to capital intensity. A curve β is an equi-rate-of-profit-curve as compared with the point S .

Armed with these analyses, we can proceed to the Ricardian theory of economic growth. According to Mr. Edelberg, we may summarize the assumptions which underlie the Ricardian theory of economic growth as follows:¹⁴

- (1) That the shape of productivity function is constantly given.
- (2) That as the amount of land per laborer increases, the marginal productivity of land falls.
- (3) That as the amount of capital per laborer increases, the marginal productivity of capital falls.
- (4) That the growth of population obeys the subsistence law.

¹⁴ V. Edelberg, "The Ricardian Theory of Profit," *Economica*,¹⁹ 1933, Feb., p. 51-74. To make matters more clear, I formulated his expressions in terms of our own terminologies, without alteration of the points.

- (5) That the supply of land is constantly given.
- (6) That the supply of saving is an increasing function of the rate of profit, but there is a sub-margin.

Let us assume, for a while, that the real wage rate is given at the subsistence level, and the rate of profit is so high that there is a strong motive for capitalists to accumulate their profits. Let us call the subsistence level of real wage rate \bar{w} . Since the total elasticity E of productivity function is constant by assumption, this means that there exists a subsistence level of labor productivity such as

$$\bar{y} = \frac{l - E}{l} \bar{w}.$$

In Fig. 7, this is denoted by a stout curve $y = \bar{y}$. By assumption (6), there exists also a sub-margin of profit rate at which there is no motive for capitalists to accumulate their profits. This is denoted with an upward-rising dotted curve.¹⁵ As far as labor productivity remains at $y = \bar{y}$, there is no growth of labor by assumption (4). By assumption (5), the supply of land is constant, so that the land intensity is also constant. At situation I, capital will be accumulated by assumption (6). So long as labor and land remain constant, situation I will move to II by capital accumulation. Only capital intensity has been increased, so that both real wage rate and rate of rent will be proportionally increased. If real wage rate is above the subsistence level \bar{w} for a long time, population (therefore labor) must now increase in geometric ratio by assumption (4). Since land is constant, land intensity must decline accordingly. But for a while the rate of capital accumulation might be higher than that of labor, because there is a time-lag in the increase in laborers. If so, situation II will move to III. At situation III, the rate of profit becomes lower, and the growth rate of labor might be above the rate of capital accumulation. Both capital and land intensities may decline, and labor productivity also may decline absolutely until the subsistence level of real wage rate $\bar{w} = (l - E)\bar{y}$ is reached again. At situation IV, one round of the game between labor and capital has been finished.

Since both situations I and IV are on the same contour curve $y = \bar{y}$, the real wage rate is the same as before, and since situation IV is on the left side of the same contour curve, rate of rent must increase and rate of profit must decrease. As far as there still exists a motivation for capitalists to accumulate capital at situation IV, the another new game will start again between labor and capital. The rule of the game is similar and another situation VII will result. In this way, the situation will move in the direction of the point

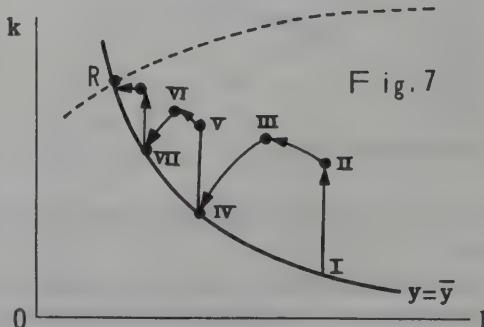


Fig. 7

¹⁶ "The motive will diminish with every diminution of profit, and will cease altogether when their profit are so low not afford them adequate compensation for the trouble, and the risk which they must necessarily encounter in employing their capital productively." D. Ricardo, Principles of Political Economy and Taxation, Everyman's Library, p. 72. The shape of this curve came from the same reasoning in the curve L in Fig. 5.

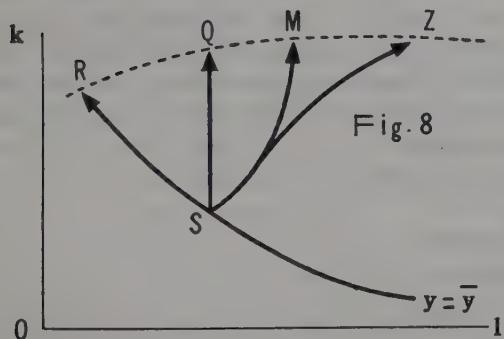
R gradually. Let us call this the Ricardian point. At the Ricardian point, capitalist economy will be in a stationary state, because the situation has reached to the sub-margin of profit rate by assumption (6). The real wage rate is at the subsistence level, and rents continue at a higher and profit at a lower uniform level.

The conclusion that the labor class is neither winner nor loser of the game between labor and capital is substantially dependent upon the assumption (4) of the subsistence law of wages. The concept of subsistence, however, underwent a fundamental transformation between Smith and J.S. Mill.¹⁶ If it is interpreted as a "physiological" subsistence level, as shown by \bar{w} in Fig.7, the stationary state must be terrible and dull, as in the case of Ricardo. It is the stationary state with a (relatively) large population and a low "natural" rate of wages. But if it is interpreted on "psychological" bases, it may be very pleasant and cultivated, because a (relatively) small population can enjoy a high "natural" level of wages.

The crucial point to notice in the present context is the relative growth rates of capital, labor and land in the course of economic growth. Indeed, even land or natural resources themselves cannot be deemed to be constant, because capitalists can cultivate new land or discover new resources by investing a part of their capital. The game is not only confined to labor and capital, but also land must come to be an active player.

A general score of the game in terms of remuneration to each factor can be shown

in Fig.8. If there is a tendency toward the point Q , the benefits of capital accumulation will be favored between labor class and land-owners. This is simply the case of $G_k > G_l = 0$. If the situation is at M , only real wage rate has risen, and rate of rent has remained constant, as compared with the starting point S . The tendency towards the point Z is sometimes called a "state of bliss". Not only profit rate, but also rate of rent declines absolutely and the labor class will be in a state of bliss.



These are the pictures of the classical stationary state. It may be the Ricardian point or may be a state of bliss. But in the normal conditions of capitalist economy, it may be plausibly maintained that the growth rate of capital is generally larger than those of labor and land, so that the stationary state, whatever it may be, must come into existence sooner or later.¹⁷

¹⁶ L. Robbins, "On a Certain Ambiguity in the Conception of Stationary Equilibrium," *Economic Journal*, 1930, June, p. 199-201.

¹⁷ It should be remarked here that as far as E_k and E_l are constantly given, the relative share of each factor is constant even at a stationary state, so that the absolute share of capitalists must increase as the capital accumulation goes on. Ricardo, however, considers a possibility of the absolute decline in profit rates in the consequence of capital accumulation. D. Ricardo, *ibid.*, p. 73.

V. Innovation and Income Distribution

So far our analysis has been carried on under the assumption of a given state of technology. A stationary state, however, can hardly be regarded as an approximation to an evolving world. As many historians show, there have been ceaseless improvements and inventions, and they have served to "prevent the yield of capital from falling below some critical level".¹⁸

In this chapter, we are going to discuss the problems of innovations, in particular in its connection with the problems of income distribution. Let us now define an innovation in terms of an overall upward shift of y -surface in Fig. 1, then an analytical expression of innovation is most clearly shown as follows. Let \bar{k} and \bar{l} be respectively the capital and land intensity over the relevant ranges of k and l . Further we define F' and F'' as the productivity functions before and after an innovation. Thus by the definition, it follows

$$F''(\bar{k}, \bar{l}) > F'(\bar{k}, \bar{l}).$$

In general we may expect that innovations will help, in the long run, to raise the level of real wages and rents, because, other things remaining constant, the rate of profit on capital will be increased by introducing new methods of production, so that the rate of capital accumulation will be increased so much. But in order to discuss the effects of innovations quantitatively, we shall maintain the assumption that the elasticities of productivity function are held constant again after an innovation. Needless to say, this does not imply that the elasticities do not undergo changes by innovations. On the contrary each elasticity will be changed by innovations, and to ask the rules of its change does constitute the main subject of the following analysis.

Let us begin with the definitions of types of innovations as follows:¹⁹

In terms of capital intensity:

- (1) if E_k' does not change, it is *capital-neutral*,
- (2) if E_k' becomes larger, it is *capital-using*,
- (3) if E_k' becomes smaller, it is *capital-saving*.

In terms of land intensity:

- (1) if E_l' does not change, it is *land-neutral*,
- (2) if E_l' becomes larger, it is *land-using*,
- (3) if E_l' becomes smaller, it is *land-saving*.

For the sake of convenience, further, we use the following notations:

	Before Innovation	After Innovation
E_k	E_k'	E_k''
E_l	E_l'	E_l''
E	$E' = E_k' + E_l'$	$E'' = E_k'' + E_l''$
y	y'	y''
w	w'	w''
r	r'	r''

¹⁸ W. Fellner, op. cit., p. 138.

¹⁹ The definition and classification of innovation came from Mrs. Robinson. J. Robinson, ibid., particularly Book VI.

Our first problem is to ask the relationship between labor productivity and real wage rate.

Let us define the growth rate of labor productivity as Gy and that of real wage rate as Gw , namely

$$Gy = \frac{y'' - y'}{y'} \text{ and } Gw = \frac{w'' - w'}{w'}.$$

Since under the condition of the maximum rate of profit, we have

$$w = (1-E)y,$$

it follows that

$$Gy = Gw + \left(\frac{E'' - E'}{l - E''} \right) \frac{w''}{w'}.^{20}$$

Thus the following results are obvious:

If $E'' = E'$, then $Gy = Gw$.

If $E'' > E'$, then $Gy > Gw$.

If $E'' < E'$, then $Gy < Gw$.

Being $E = E_k + E_l$, we can summarize these conclusions in the following table:

	land-neutral	land-using	land saving
capital-neutral	$G_y = G_w$	$G_y > G_w$	$G_y < G_w$
capital-using	$G_y > G_w$	$G_y > G_w$	$G_y \geq G_w$
capital-saving	$G_y < G_w$	$G_y \geq G_w$	$G_y < G_w$

Remember that these conclusions are valid under any assigned k and l on the y'' -surface.

As will easily be seen, if the case is the combination of capital-using and land-saving innovation or capital-saving and land-using innovation, any definite conclusion cannot be drawn. For instance let us take the former case. Capital-using innovation implies that the marginal productivity of capital becomes larger than its average productivity, so that if it is combined with land-neutral innovation, both real wage rate and rate of rent will increase at the smaller rate than rate of profit. But if it is combined with land-saving innovation, and if such land-saving bias is so strong that E'' becomes smaller than E' , real wage rate will increase faster than labor productivity. *Mutatis mutandis*, it is also true of the case of the combination of capital-saving and land-using innovation.

Next problem is to ask the relationship between labor productivity and rate of rent. Let us denote Gr as the growth rate of rent, namely

$$Gr = \frac{r'' - r'}{r'}.$$

We know already that under the condition of the maximum rate of profit, we have

$$r = \frac{\partial y}{\partial l}.$$

This condition must be true after as well as before innovation. Now to reach to quantitatively definite conclusions here, we want to compare the situations which are characterized

$$^{20} Gy = \frac{y''}{y'} - 1 = \left(\frac{1 - E'}{1 - E''} \right) \frac{w''}{w'} - 1 = \left(\frac{1 - E'}{1 - E''} \right) \frac{w''}{w'} + Gw - \frac{w''}{w'}.$$

From this last equation, we obtain the above equation.

by the same land intensity. It does not matter whether such situations are realizable or not in reality. Thus it follows

$$Gy = Gr + \left(\frac{E_l'' - E_l'}{E_l'} \right) \frac{r''}{r'},^{21}$$

From this last equation, the following conclusions are clear:

If $E_l'' = E_l'$, then $Gy = Gr$.

If $E_l'' > E_l'$, then $Gy > Gr$.

If $E_l'' < E_l'$, then $Gy < Gr$.

Under the condition of the same land intensity, we have again the following table:

	land-neutral	land-using	land-saving
capital-neutral	$G_y' = G_w = G_r$	$G_r > G_y > G_w$	$G_w > G_y > G_r$
capital-using	$G_y = G_r > G_w$	$G_r > G_y > G_w$	$G_w \geq G_y > G_r$
capital-saving	$G_w > G_y = G_r$	$G_r > G_y \geq G_w$	$G_w > G_y > G_r$

What is then the effect of innovations on what we call capital-output ratio? This is the third question which we must discuss. Here again if we intend to compare two situations which are under the same profit rate, it is immediately clear that in case of capital-neutral innovations the capital-output ratio must be the same both before and after innovations, because the average productivity of capital must be equal in both situations. If they are capital-using, the capital-output ratio must increase and if they are capital-saving, it must decline. Remember that these conclusions are quite independent of biases in land-innovations. Thus under the condition of the same rate of profit, we have the following results:

Type of Innovation	Capital-Output Ratio
capital-neutral	constant
capital-using	increasing
capital-saving	decreasing

Whether innovations raise capital-output ratio or not must be answered only by observations of reality, but it should be careful that this answer has to be formed on the base of the same profit rate, because, other things being equal, the higher the rate of profit, the smaller the capital-output ratio, so that if we do not bear in mind this basic criterion, we might be led to misjudge, for example, capital-using innovation as lowering the capital-output ratio.

So far, we have been concerned with the discussion of properties of innovations, particularly in their connection with the problems of income distribution. As a last problem in this chapter, we want to shed some light on the problem of the rate of innovation itself.

As far as the elasticities of productivity function are held constant, it was proved that (see footnote 12)

²¹ $Gy = \frac{y''}{y'} - 1 = \frac{E_l'}{E_l''} \frac{U''}{U} \frac{r''}{r'} - 1 = Gr - \frac{r''}{r'} + \frac{E_l'}{E_l''} \frac{U''}{U} \frac{r''}{r'}$

where U' and U'' are the land intensity before and after innovation. By assumption U' is equal to U'' . Thus we obtain the above equation in the text.

$$y = A^E k^E l^E,$$

where A is any structural parameter. Let us define the productivity functions before and after innovation as follows:

$$\begin{aligned} y' &= A' k^{E'} l^{E'} \dots\dots\dots \text{before innovation} \\ y'' &= A'' k^{E''} l^{E''} \dots\dots\dots \text{after innovation.} \end{aligned}$$

Since an innovation is defined in terms of an overall upward shift of productivity function, the progress rate in innovations can be most explicitly expressed in terms of upward shift in A , namely

$$Gi = \frac{A'' - A'}{A'}.$$

It should be remembered that Gi has nothing to do at all with properties of innovations, but the movement in Gi is most crucial to the development of capitalist economy. If the retardation of progress rate in innovations appears, what bias they may have, a growing menace of the classical stationary state will assault the capitalist economy and make it fall into "secular stagnation". There might be perhaps an inherent rule in changes in the progress rate of innovations. But the detailed analysis of this problem is beyond the scope of this paper.

²² Tinbergen presented the following economic model in his 1942's article:

$$u = e^t a^t K^{t-\lambda}$$

where u is net output, a labor and K capital and land. e denotes, according Tinbergen, "element of technical development". J. Tinbergen, "Zur Theorie der langfristigen Wirtschaftsentwicklung", Weltwirtschaftliches Archiv, Mai 1942, s. 511-549.

BEHAVIOR OF COMMERCIAL BANKS AND THE SUPPLY OF MONEY

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I. Introduction

The purpose of this paper is to study the behavior pattern of commercial banks in order to clarify the mechanism whereby part of the money supply created through banking activity is changed, and to provide for one of the preliminary steps for approaching the business cycle.

A peculiarity of the asset and liability structure in post-war Japanese banks is their heavy dependence upon borrowings from the Bank of Japan, especially in the later stages of a boom and/or in the early stage of the downswing and also the relatively low holdings of securities. The former amounted to 305 billion yen and the latter to 799 billion yen at the end of December 1957 compared with 5,024 billion yen of loans and discounted bills at that time, while, according to the *Federal Reserve Bulletin*, in the United States at the same date loans amounted to 115,115 million, U.S. government obligations and other securities to 88,735 million and borrowings to 80 million dollars in the balance sheet of all the banks. Since the bond market has not recovered sufficiently to fully absorb the issues of corporate as well as government bonds, enabling the price of bonds to reflect market conditions, the banks prefer making loans and discounting to holding bonds. And in this situation they are likely to resort to funds supplied by the Bank of Japan, because of the shortage of their own available funds and the favorable differentials between the rate of interest on bills discounted as well as on loans and the rediscount rate, for instance, of commercial papers at the Bank of Japan.¹

Taking into account this characteristic of the asset-and liability-composition of commercial banks, we shall construct a model for our problem i.e., to see how the supply of new money created by the bank is determined through the demand for and supply of bank loans.^{2,3}

¹ In 1959 the average for the former was 8.12% and the latter 7.30% from January 1st to February 19th, 6.94% from February 20th to December 1st and 7.30% since December 2nd.

² The reader should keep in mind that the equilibrium between the demand for and supply of loans does not necessarily imply that between the demand for and supply of money, even when we define loans to include not only bank loans but also bonds.

³ What effect the supply of money, determined in the manner described in the following, has on investment and therefore on the economy, was analyzed in my paper "Cyclical Process of Growth and the Balance of Trade" (in Japanese), *Keizai Kenkyu*, Vol. 11, April 1960, pp. 148-159.

II. A Model for Deriving the Supply of Bank Loans

In monetary theory there are certain well-known formulas showing the relationship between autonomous increases in deposits and induced increases in bank loans during credit expansion. It is seldom noted, however, that these formulas are not based on the bank's motivation of profit maximization, so that they do not result in a supply schedule of bank loans.⁴ If the private bank pursues profits no less than the non-financial firm, we should take this into consideration in deriving the supply schedule of bank loans.

In constructing our model in the light of the peculiarity of the Japanese financial situation discussed above, we will ignore, for simplicity, bank holdings of securities, selecting as our strategic variables bank loans and bank borrowings from the Bank of Japan. First of all, let us define our concerned variables as follows;

L_s : gross increase in the supply of bank loans,

l_s : repaid amount of bank loans,

ΔD_a : autonomous net increase in deposits, referring to that part of the increase which is beyond the control of the bank,

ΔD_d : net increase in the deposits induced by the net increase in bank loans ($L_s - l_s$),

ΔM : increase in the bank's required cash balances,

B : the bank's gross new borrowing from the Bank of Japan,

b : the repaid amount of the bank's borrowing from the Bank of Japan,

i_1 : the rate of interest on bank loans,

i_2 : the rate of interest on deposits (we assume that i_1 is greater than i_2),

i_3 : the rate of interest on the bank's borrowed money from the Bank of Japan.

We shall ignore variables appearing in the bank's balance sheet other than those defined above.

We assume that the bank seeks to maximize profits brought about by a net increase in bank loans ($L_s - l_s$).⁵ Let us express profits by π which is defined as follows;

$$(II. 1) \quad \pi = i_1(L_s - l_s) - i_2(\Delta D_a + \Delta D_d) - i_3(B - b).$$

Next, the increase in the required cash balances ΔM is assumed to be proportional to

⁴ As far as the author knows, Professor H. Kawaguchi derives the supply curve of loans under the assumption that the bank maximizes profit. See H. Kawaguchi: *Money and the Economy*, (in Japanese), Tokyo, 1958, p. 225 ff.

⁵ Total profits earned by the bank in a given period, which we denote by π_w , will be expressed as follows;

$$\pi_w = i_1 L'_s - i_2 (D'_a + D'_d) - i_3 B' - C,$$

where the notation ' is added to L_s , D_a , D_d and B , respectively to show the average balances of relevant variables during the period instead of the original flow-amounts, and C represents costs other than interest on deposits and on borrowed money, which are assumed to be constant. But in the short-run planning of the loan supply, the bank will maximize profits not with the total balances of loans in mind but with the increase in loans, because it cannot, for the moment, manipulate the balances of loans or of borrowed money which are predetermined in the short run. Thus, the bank will attempt to maximize the increase in total profits ($\pi_w - \pi_{w-1}$), where π_{w-1} is total profits in the previous period. ($\pi_w - \pi_{w-1}$) corresponds to π in the text.

the increase in deposits, i.e.,

$$(II. 2) \quad \Delta M = \alpha(\Delta D_a + \Delta D_d); \quad 1 > \alpha > 0.$$

α is not always constant in a long-run model, which takes account of the changes in the total asset-composition aiming at maximizing total profits defined in footnote 5). We assume, however, that it remains constant for the moment. On the other hand, we will suppose that the increase in the induced deposits ΔD_d is a function of the net increase in loans ($L_s - l_s$) such that

$$(II. 3) \quad \Delta D_d = \beta(L_s - l_s); \quad 1 > \beta > 0.$$

Since the magnitude of β will fall with the lapse of time because of the withdrawal of the induced deposits, the value of β depends on the length of our unit period. We shall discuss this point later when we investigate the actual processes of the repercussion from L_s to B . For the moment we assume that it is constant.

Thus the increase in cash balances ΔM is shown as a function of the increase in autonomous deposits ΔD_a and that in bank loans ($L_s - l_s$), and ΔD_d as a function of the latter. ΔD_a is autonomously given to the bank, the amount of which is assumed to be positive in the following, while l_s and b are predetermined in planning for the supply of new loans. Therefore the bank will manipulate both L_s and B in equation (II. 1) so as to maximize profits π . The manipulation is possible, however, only within certain limits, for there are restrictions on the bank's behavior. The first restriction is the following relating to the bank's balance sheet;

$$(II. 4) \quad L_s + \Delta M \leq \Delta D_a + \Delta D_d - l_s + B - b.$$

If we take the actual value of each variable in the above equation, we should have equality between the right-hand and the left-hand sides. But both sides do not necessarily coincide when ΔM expresses the required increase in cash balances, i.e., from the standpoint of the bank's available funds it suffices that the left-hand side showing the uses of the funds is at most equal to the right-hand side showing their sources.

Second, the new gross supply of loans as well as the new gross borrowing from the Bank of Japan cannot be negative, respectively. That is,

$$(II. 5) \quad L_s \geq 0; \quad B \geq 0.$$

Finally the possible amounts of money which can be newly borrowed from the Bank of Japan by bank, \tilde{B} , will be an increasing function of the gross increase in bank loans L_s , as suggested by the rediscounting of the discounted bills. However, the fact that the Bank of Japan decides monetary policy independently of bank's intention will set a ceiling on the amount of borrowing which can be expected by the latter. Let us denote the expected ceiling by \bar{B} , and suppose that

$$(II. 6) \quad \tilde{B} = \phi(L_s),$$

where the function ϕ is assumed to be equal to γL_s so far as the latter is less than or equal to \bar{B} , and equal to \bar{B} when γL_s is greater than \bar{B} . It is plausible to assume that γ is greater than zero and less than unity. Thus, we obtain the third restriction

$$(II. 7) \quad B \leq \tilde{B} = \phi(L_s).$$

The bank will determine the size of L_s and B , so that it may maximize the profit equation (II. 1) under the restrictions (II. 4), (II. 5) and (II. 7).

We can rewrite equation (II. 4) by taking into account equations (II. 2) and (II. 3) to get

$$(II. 8) \quad L_s \leq \delta_0 \Delta D_a - \delta_1 b + l_s + \delta_1 B,$$

where

$$(II. 9) \quad \delta_o = (1-\alpha)/[1-(1-\alpha)\beta],$$

and

$$(II. 10) \quad \delta_1 = 1/[1-(1-\alpha)\beta].$$

The coefficient of ΔD_a , δ_o , shows the maximum amount of credit expansion brought about by the autonomous increase of one unit of money in deposits, and similarly the coefficient of B , δ_1 , expresses the greatest magnitude of credit expansion possible by borrowing one unit of money from the Bank of Japan. Since the restriction (II. 5) means that a possible combination of L_s and B lies in the first quadrant of the $(L_s \cdot B)$ plane, the feasible set satisfying (II. 5) and (II. 8) should be included in the domain bounded by the straight line a , line f_10 and the B axis in Fig. 1, where line a is given by (II. 8) excluding the inequality, whose slope in regard to B is equal to δ_1 , therefore greater than unity. It is reasonable to assume that l_s is larger than b multiplied by the expansion coefficient δ_1 . For when bank loans were supplied by l_s , the bank probably borrowed from the Bank of Japan by b . This assumption is a sufficient condition for the intercept of straight line a on the vertical axis to be positive. On the other hand the feasible set must be located within the domain bounded by curve ϕ and the L_s axis in Fig. 1, because of the restrictions (II. 5) and (II. 7). Therefore it is the shaded area (a closed set) in the case of Fig. 1. It could take various shapes according to the magnitudes of the coefficients α , β and γ and the predetermined variables b and l_s . But we can analyze them similarly as in the case of Fig. 1, so that in the following we will confine ourselves to an analysis of the latter case.

Now by rewriting equation (II. 1) we get

$$(II. 11) \quad L_s = [(\pi + i_2 \Delta D_a - i_3 b) / (i_1 - i_2 \beta)] + l_s + [i_3 B / (i_1 - i_2 \beta)].$$

From this equation we are able to derive the iso-profit lines corresponding to the various amounts of π , under given rates of interest. If the derivative of the iso-profit line in regard to B is less than the slope of line a , i.e., if

$$(II. 12) \quad i_3 / (i_1 - i_2 \beta) < \delta_1,$$

we have iso-profit lines π_1 , π_2 , and π_3 as shown in Fig. 1. The greater the amount of profits π , the more the iso-profit line shifts upward, so that the π_2 line corresponds to greater profits than π_1 line, and similarly π_3 line to larger profits than π_2 line. Insofar as the bank seeks maximal profits within the feasible set, the iso-profit line passing through point f_2 produces the greatest profits, and that point gives it the optimal combination of L_s and B .

Secondly, provided that both slopes are equal to each other, i.e.,

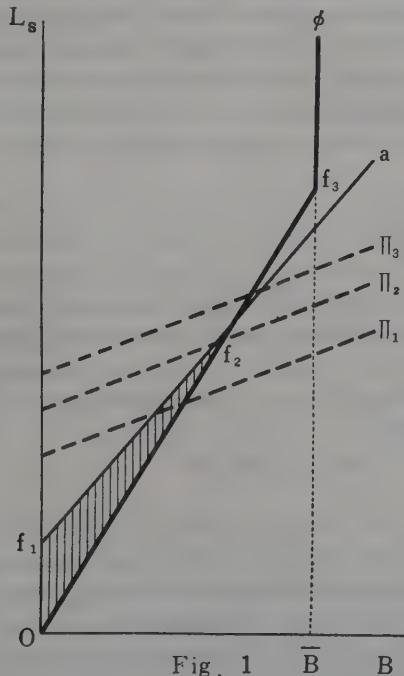


Fig. 1

$$(II. 13) \quad i_3 / (i_1 - i_2 \beta) = \delta_1,$$

any point belonging to the closed part of line a bounded by f_1 and f_2 is the optimal.

Thirdly, if

(II. 14) $i_3/(i_1 - i_2\beta) > \delta_1$,
then point f_1 is optimal. Therefore bank's schedule relating the supply of loans with i_1 ,

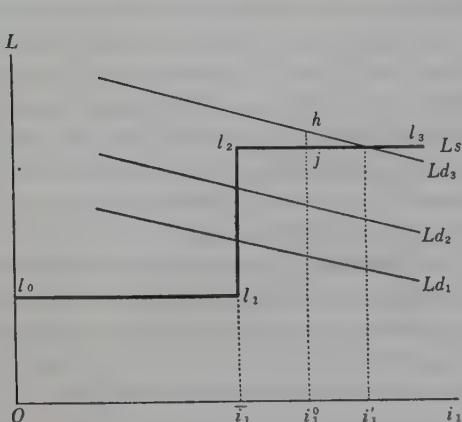


Fig. 2

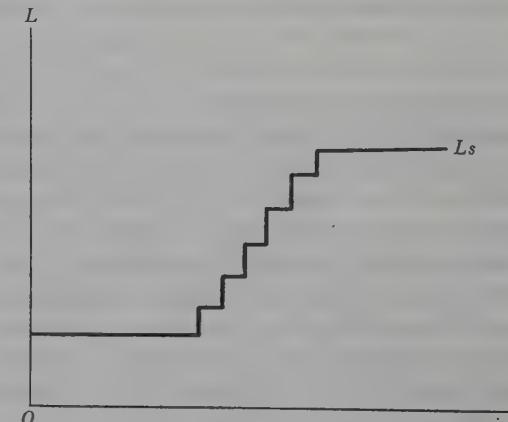


Fig. 3

under given ΔD_a , l_s , b , i_2 and i_3 is a step function as shown in Fig. 2. That is to say, when we denote the rate of interest on loans satisfying equation (II. 13) by \bar{i}_1 , the supply curve of loans jumps at \bar{i}_1 from l_1 to l_2 . Since different circumstances exist for different banks, it is possible that the size of α (or β) in one bank differs from those in another. If this is true, \bar{i}_1 in the former takes a different magnitude than in the latter, therefore the supply curve in the loan market as a whole will have many steps as indicated in Fig. 3.

III. The Market for Loans and the Supply of Money

In the above we have worked out the supply curve of bank loans as a tool to investigate the market for loans and the supply of money relating to it. Now we will proceed to utilize it for our purposes.

For simplicity we will assume that the supply schedule of loans is given as in Fig. 2, and that the firm's demand for loans L_d is given by

$$(III. 1) \quad L_d = L_d(Y, i_1), \quad \partial L_d / \partial Y > 0; \quad \partial L_d / \partial i_1 < 0,$$

where Y represents income.

A shift of the demand curve for loans induced by a change in income, say, that from L_{d1} to L_{d2} in Fig. 2 does not cause any change in the rate of interest. Namely, as far as the shift occurs within the vertical part of the L_s curve in Fig. 2, the supply of loans is adjusted completely to the change in the demand for loans. We might say in this case that the former follows the so-called "needs of trade". But insofar as the latter shifts between l_2 and l_3 in the L_s curve, the amount of loans supplied does not change at all, and the effect is concentrated in changes in the rate of interest. Similarly the shift of demand

within the downward step l_0l_1 does not influence the amount of loans supplied. In both cases the supply of money connected with the bank loans behaves as if it were autonomous. Thus whether it is induced by the demand for loans—"needs of trade"—depends on the conditions that prevail in the economy. There are two extreme situations included within one supply schedule of loans. In one situation the supply of loans shows a completely flexible reaction to the demand and the rate of interest is completely inflexible, while in the other situation, the reverse is the case.⁶

Next let us see what kinds of adjustments will occur between the demand for and supply of bank loans, when changes in the interest rate on loans are restricted by a ceiling above which it cannot legally rise as in the case of post-war Japan.

The situation to be investigated here is where the highest possible rate of interest is less than the equilibrium rate of interest which would be obtained in a free market. Suppose that i^0_1 is the ceiling rate and that the demand curve for loans is located at L_{d3} in Fig.2. There appears an excess demand for loans in the market by jh under i^0_1 . Then banks will compete for deposits from customers. Apart from the competition among banks for deposits,⁷ there are four possible ways to make the excess demand disappear. First, to some extent the bank has the power to shift the ϕ function (or l_2l_3 part of L_s curve) to the right (or upward), raising the supply of loans, for the ϕ function depends on the bank's expectation or judgement concerning the attitude of the Bank of Japan toward supplying funds to the bank. Or second, the bank could adjust the supply of loans to the demand under the given i^0_1 by decreasing the cash reserve ratio α . Taking the first or the second or both, the same kind of increasing risk exists, i.e., the probability greater than otherwise, that its vault cash balances will be depleted. When it faces the depletion of cash balances because of taking either the first or the second course, it will have to replenish its cash balances by means of call loans, which was ignored in the above analysis. It happens not infrequently in such cases that the call rate becomes higher than the rate of interest on loans as in 1957 and 1958. And the bank faces the gamble of sustaining a loss caused by a higher interest on call loans, if it does not succeed in maintaining cash reserves. By means of increasing the call rate, it is possible to adjust the gap between the demand for and supply of bank loans to some degree, when the loan rate is controlled and the call rate is not, as in the case of the present Japanese economy. When there is an excess demand for funds in one part of the economy, and at the same time there exists an excess supply of funds in the rest of economy, the call market could work as an adjustor for equilibrating the loan supply with the demand. But when there is a tendency for an over-all excess demand for loans, changes in the call rate are not in effective in bringing equilibrium to the loan market as a whole, apart from its function of adjusting the temporary surplus or short-

⁶ In the text we ignore the change in ΔD_a . But we probably have a changing ΔD_a , when the L_s curve shifts upwards or downwards owing to fluctuations in income, because ΔD_a is a function of income Y , even though it is a given datum to the bank itself.

⁷ This does not have any effect on the excess demand in the economy as a whole, unless the bank transforms savings held by the public in the types of assets other than deposits into deposits. But if the costs of gathering deposits are increased, so that the bank must raise i_2 , this will influence the situation to some extent. This point was suggested by Mr. H. Eguchi of the Bank of Japan.

age of bank funds.⁸ Thus the bank will resort to the third course, i.e., an upward shift of the upper step of the supply curve of loans by raising the marginal ratio of induced deposits to loans β . It is common practice in Japan that when a firm borrows funds from a bank, the latter asks the former to reserve some proportion of the loan in the form of deposits without withdrawal. Under the assumed situation the bank intensifies this kind of credit standard by an increase in β , which causes the excess demand for loans to disappear by an upward shift of the L_s curve, and at the same time raises the actual rate of interest on loans, even though the nominal rate remains at the level of i_1^0 . Therefore by this manipulation the bank can superficially increase the supply of loans by j_h , so as to equilibrate with funds demanded of $i_1^0 h$ in Fig.2, but in fact it attempts to approach the rate of interest i_1' corresponding to the intersection of L_s curve and L_{d3} curve.

Fourth and finally, income Y has to fall in order for the L_d curve to shift downwards, if the above three means cannot restore equilibrium in the loan market. Falling income means that the firm must revise its original production plan and cut down production, because some amount of the funds needed at a certain level of expected sales or intended production can not be satisfied with the supply in the loan market. It is in this case that the supply of loans becomes a limiting factor on production. Although the increase in the money supply caused by the increased borrowing from the Bank of Japan appears as though it resulted from banking and business activity until the rate of interest reaches the ceiling, here we see the autonomous aspect of the money supply of the Bank of Japan through the medium of banks. It is to be noted that the upper as well as the lower step of the L_s curve will shift downward with falling income through a decrease in ΔD_a . Accordingly the cutback in production should cause a downward shift of the L_d curve sufficient to counter-balance that of the L_s curve.⁹

IV. The Business Cycle and Expansion of Bank Loans

Using the above model, now let us see how new bank loans expand and contract in relation to new borrowing from the Bank of Japan in the course of the business cycle. This will serve as a bridge connecting our theoretical analysis with the statistical data below.

Suppose that we are in the stage of recovery and / or upswing and that the initial starting point is a certain point belonging to the closed set bounded by point f_1 and f_2 on line a in Fig.4. If equation (II. 12) is satisfied in the loan market, then we have point f_2 as the starting point. Or if equation (II. 13) holds true there, it could be any point belonging to the closed set. Furthermore, when we have equation (II. 14), it is point f_1 . Provided

⁸ Although this temporary adjustment in the fund market is merely the original function of the call market, it seems to play other roles also in the present Japanese economy. That is, in the call market city banks appear as permanent borrowers and rural banks as well as other financial institutions as permanent lenders. When banks, especially city banks face diminishing cash reserves due to over-lending (compared to available funds), they first attempt to escape from the difficulty by borrowing funds from the Bank of Japan. But when they are not successful in borrowing, they try to transfer the overloans to the rural banks and other financial institutions by inviting call loans from the latter. This is one aspect of the peculiar financial situation in Japan described at the outset of this paper.

⁹ Here we implicitly assume that the demand for loans is more elastic in regard to income than the supply of loans, whose relation with income is realized through changes in the autonomous deposits ΔD_a .

that it is included in an open set marked off by f_1 and f_2 , market equilibrium will run upwards along f_1f_2 of line a as income increases, so far as line a remains at the original position. The increase in income will result, however, in an increase in ΔD_a , so that line a will shift upward and the equilibrium path will deviate from the original a line with the lapse of time. But, as long as the relationship among the interest rates makes the intersection of the ϕ curve and a line be an equilibrium point, the new bank loans L_s will move on the ϕ curve in the process of expansion. Under a sufficient increase in the demand for bank loans, the bank will find sooner or later that it has exhausted the expected maximal amount of

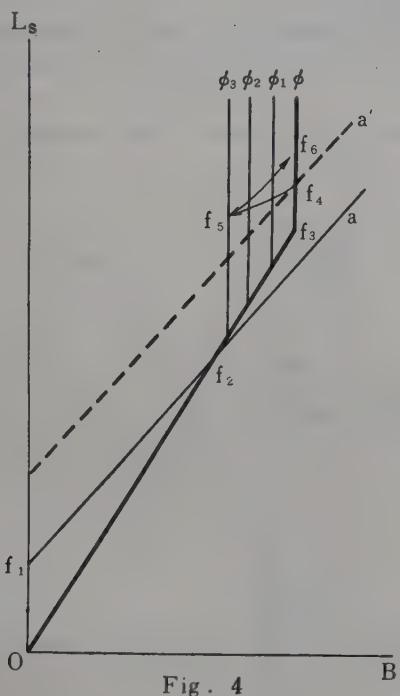


Fig. 4

borrowing from the Bank of Japan in spite of further increasing demand for new bank loans. If regulations fix a ceiling on the interest rate on loans, we shall find the excess demand for loans under the fixed rate, which will induce the movement toward adjustment as discussed above. But the maximal amount of borrowing \bar{B} itself is not at all constant, because it will be affected by the Bank of Japan's actual behavior which is mirrored in the fluctuations in its new supply of funds to the bank determined, for instance, on the basis of foreign exchange reserves. As a result, when the reserves are diminishing in the course of the upswing, \bar{B} cannot help decreasing gradually, and the ϕ curve will shift, as from ϕ to ϕ_1 and ϕ_2 in Fig. 4. Suppose \bar{B} begins to decrease at point f_4 . Then, if the balance sheet restriction on the bank remains at line a' , both L_s and B will be reduced along line a' . Alternatively, if it shows downward shifts from line a' because of falling income, we

obtain a contraction path having a steeper slope than line a' . By judging from the increase in the fixed time deposits, which does not fall even in the downswing, however, it seems reasonable at least in the Japanese economy to assume that the autonomous increase in deposits ΔD_a exhibits steady growth. If so, perhaps line a shifts upwards to some extent even in the downward process and we may observe a movement such as from f_4 to f_5 , although the decrease in $[l_s - \delta_1 b]$, if it occurs, could counterbalance the upward shift of line a .¹⁰ On the other hand, when the international balance of payments turns favorable, so that foreign exchange reserves are accumulated, we find the opposite phenomena. And when the ϕ curve shifts enough to make line a intersect with it in the initial form but in greater L_s and B than before, one cycle will have been finished.

¹⁰ Note that the intercept of line a on L_s axis is $[\delta_0 \Delta D_a - \delta_1 b + l_s]$.

V. A Statistical Investigation of the Behavior of the Bank

Let us turn to a statistical investigation of the behavior of the bank. First of all, we shall examine the course of expansion or the relationship between L_s and B over time. From now on our analysis will be stated in terms of the net increase in bank loans ΔL_s defined by $(L_s - l_s)$ and that in borrowing ΔB defined by $(B - b)$ instead of L_s and B , for the reason that figures for L_s and B are not available.¹¹

After adjusting the monthly data for seasonal variations by the use of twelve-month moving averages, we compare ΔL_s with ΔB and find that the latter lags behind the former. The fluctuations of ΔL_s are not immediately reflected in ΔB in the actual behavior of the bank, because the magnitude of β is not constant but falls with the passage of time as noted in Section II. Immediately after the bank has increased its loans, it will be nearly equal to unity. Then the bank need not depend on borrowing from the Bank of Japan. Only when deposits created by means of a loan expansion are withdrawn, so that the bank's cash reserves fall below the required needs, does the bank borrow funds from the Bank of Japan. Therefore, it is fully possible that the increase in borrowing ΔB corresponding to that in bank loans in a given period occurs some periods later in the form of, say, rediscount of bills at the Bank of Japan, which

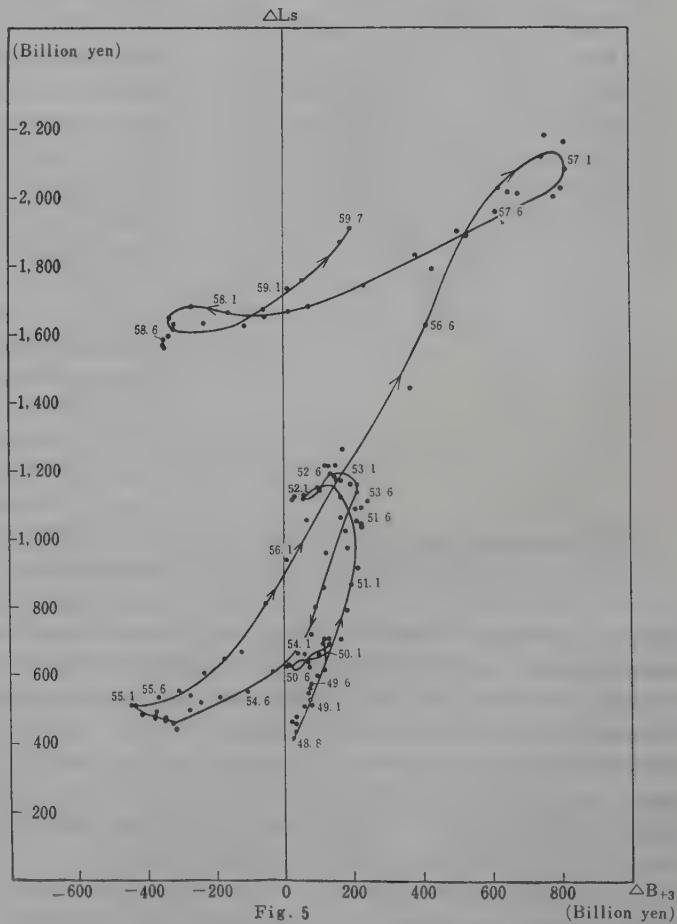


Fig. 5

¹¹ We can easily transform our a line and ϕ curve into those in terms of ΔL_s and ΔB . The transformation does not change the results obtained above except for a change in the intercept of line a from $(\delta_0 \Delta D_a - \delta_1 b + l_s)$ to $\delta_0 \Delta D_a$ and the appearance of a possibility that ΔL_s and ΔB could be negative though both L_s and B must be non-negative. Statistical data are taken from *Honpo Keizai Tokei* (Economic Statistics of Japan), published by the Bank of Japan, 1948-1959.

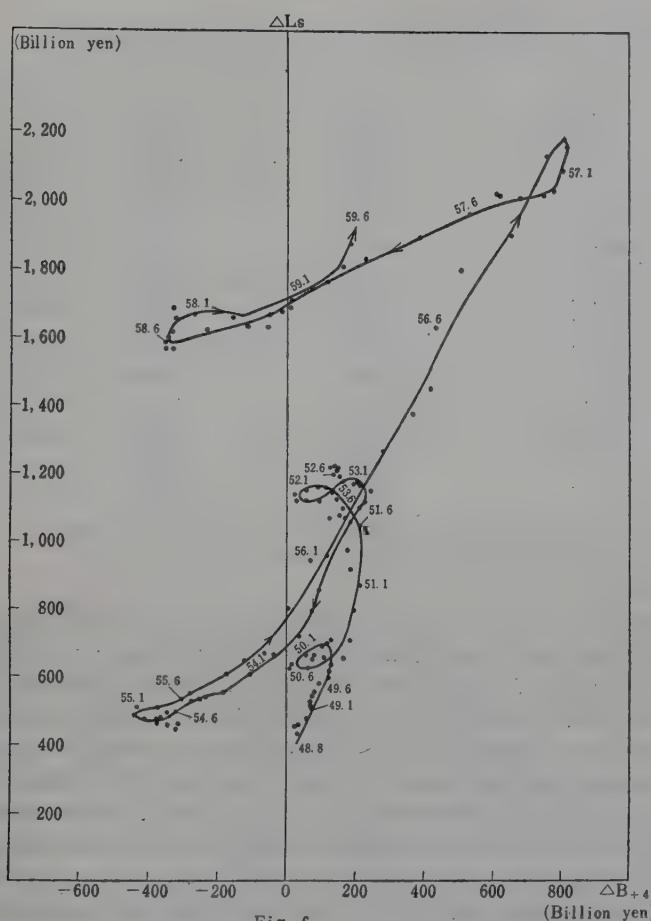


Fig. 6

that of June 1957 to June 1958 than we expected. Therefore the lag of ΔB behind ΔL_s seems to be three or four months and closer to three than to four months.

The characteristics of the expansion path will be clearer, if we can get information on interest rates, the required cash reserve ratio α and the induced deposit ratio β . The rate of interest on bank loans i_1 will be represented by the average of interest rates on loans and yield on securities held by ordinary banks and the rate of interest on deposits i_2 by the cost of the deposits borne by them.¹² To get an indicator of i_3 , we divided the

¹² In order to take advantage of the series on borrowing by all banks for as long as possible, we shall use below not the increase in borrowing from the Bank of Japan but that in total borrowing. The difference between them is very small.

¹³ In our theoretical investigation we exclude, for simplicity, securities held by the banks, and assume that costs other than interest paid are constant. In order to deal with these points within our model, we pick up here the average of interest rates on loans and yield on securities held by ordinary banks and the cost of deposits instead of the rate of interest on loans and that on deposits.

were discounted at the bank after the original increase in loans. In the case of a three or four-month lag of ΔB behind ΔL_s we obtain an expansion path which is nearly the same as that which could be expected theoretically, as shown in Fig. 5 or Fig. 6, where the numbers designate the month and year of the corresponding points, (as e.g., 48.8 denotes August 1948), and both ΔL_s and ΔB are seasonally adjusted but multiplied by 24 for convenience in computation.¹² In examining Fig. 5 and Fig. 6 closely, we find, however, that in the former the expansion path has a loop moving clockwise for one year starting from June 1956, which was not anticipated theoretically, and in the latter the path in January 1958 to June 1959 approaches closer to

Table 1

Fiscal year	i_1	i_2	i_3
1951 F. H.	8.978%	7.191%	5.525%
L. H.	9.162	7.452	6.531
1952 F. H.	9.032	7.346	6.189
L. H.	8.838	7.076	5.228
1953 F. H.	8.785	7.120	5.372
L. H.	8.632	6.680	6.187
1954 F. H.	8.722	7.027	7.456
L. H.	8.603	6.802	7.582
1955 F. H.	8.493	6.854	6.547
L. H.	8.258	6.673	5.513
1956 F. H.	8.078	6.604	1.928
L. H.	8.042	6.477	2.499
1957 F. H.	8.221	6.785	6.065
L. H.	8.351	6.827	8.949
1958 F. H.	8.306	6.993	10.389
L. H.	7.962	6.812	7.148

* F. H. refers to the period from April to September, and L. H. to that from September to March of the next year.

sum of the revenues on the interest on bills discounted and on loans by the average sum of bills discounted and loans at the end of each month in the Bank of Japan accounts.¹⁴ According to Table 1, i_3 was higher than i_1 only in the latter half of 1957 and the first half of 1958.¹⁵ Because the size of α will be negligible, the slope of line a will depend largely on that of β . On the other hand, the slopes of the iso-profit lines also depend upon β . Since it is very difficult to estimate, we are unable to determine how both slopes have changed in our concerned period. But provided it was nearly equal to 0.3,¹⁶ it seems that the slope of the iso-profit lines was less than that of line a except in the latter half of 1957 and the first half of 1958. We can therefore infer that condition (II. 12) prevailed in almost all periods. If this was true, the expansion path in the downswing and the depression of 1954 to 1955 in Fig.5 or Fig.6 might have been strongly affected by contractions in B caused by the direct control of credits by the Bank of Japan. On the other hand, in the downswing of 1957 to 1958 it might have been influenced by the increase in the interest rate on borrowing from the Bank of Japan as well as by the direct control of loans, the former of which probably made the slope of the iso-profit line coincide with that of line a .

Next, what effect does the expansion of loans have on the supply of money? We will examine this by means of the following four magnitudes. (See Fig.7.¹⁷) The first is the difference between the monthly net increase in bank loans and that in saving deposits,

¹⁴ Data on interest revenues are taken from the Ministry of Finance: *Ginko Kyoku Kinyu Nenpo* (Annual Report of Banking), 1952-1959.

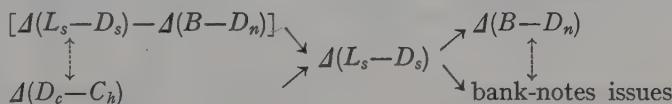
¹⁵ In 1956 i_3 was abnormally small. The reason seems to lie in our method of calculating i_3 by means of the average sum of bills discounted and loans at the end of month.

¹⁶ It is said that the restricted deposits remaining in the borrower's account comprise about 30% of the total. *Chuo-Ginko Seido* (Central Banking System), edited by the Ministry of Finance, 1959, p.29.

¹⁷ In Fig.7 we show the relevant magnitudes adjusted for seasonal variations by the use of twelve-month moving averages, but expressed in terms of a two-year rate except in the series for the call rate i .

defined as the sum of fixed time deposits and installment savings. Denote it by $\Delta(L_s - D_s)$. $\Delta(L_s - D_s)$ is merely the increase in the money supply induced by the banking activity. Secondly, by subtracting the increase in the bank's own deposits with other ΔD_n from that in the bank's borrowing ΔB , we can get an indicator expressing the change in the degree of the bank's dependance on the Bank of Japan. This indicator $\Delta(B - D_n)$ informs us of the nature of the fluctuations in the bank-notes issued through the commercial banks' activity. The third magnitude we are concerned with is $[\Delta(L_s - D_s) - \Delta(B - D_n)]$ showing part of changes in loans which is supplied by the bank without depending on borrowing from the Bank of Japan and also on saving deposits. And finally we are interested in the increase in short-term deposits¹⁸ less checks and bills held by the bank $\Delta(D_c - C_h)$.

In regard to the leads and lags among these four magnitudes we can observe the following points. First it is evident from Fig.7 that $\Delta(L_s - D_s)$ leads $\Delta(B - D_n)$ at the peak of the cycle, but both reach the bottom at about the same time. Second, $\Delta(L_s - D_s)$ lags behind $[\Delta(L_s - D_s) - \Delta(B - D_n)]$, while the latter conforms to that of $\Delta(D_c - C_h)$, with the result that $\Delta(D_c - C_h)$ leads $\Delta(L_s - D_s)$. Hence we have the following schema of timing of the relevant variables;



According to this schema, it seems at first sight there was a causal relationship between $\Delta(D_c - C_h)$ and $\Delta(L_s - D_n)$. But if we closely examine the entirety of the relationships, the fact that $\Delta(D_c - C_h)$ leads $\Delta(L_s - D_n)$ implies rather the following; in the early stage of recovery the bank supplies loans to the firms without borrowing from the Bank of Japan, so that the first "runner" is $[\Delta(L_s - D_s) - \Delta(B - D_n)]$, and at the same time the loans supplied in this way induce increases in short-term deposits, i.e., in deposit currency. Insofar as deposit currency thus created circulates among business firms, there does not occur any decrease in short-term deposits in the banks as a whole, so that it does not intensify dependence on the Bank of Japan. But when the firms have to make net payments to households, short-term deposits held by firms are withdrawn. Since households in Japan usually do not open current deposit accounts in the banks, although they hold assets in the form of ordinary deposits, the banks now face decreasing cash reserves, depending on borrowing to counterbalance the decrease in cash reserves. As a result bank-notes issues will increase.¹⁹ This is our explanation of the above leads and lags. It illustrates how the course of the business cycle changes the composition of the money supply created by banking activity, which consists of deposit currency and cash currency. This money supply is not autonomous but induced by banking and business activities, except when banking activity hits the ceiling fixed by the behavior of the Bank of Japan as described in Section III.

One of the interesting phenomena relating to the bank's money supply is the fact that the banks' increase in net call money (representing the increase in the difference between call money and call loans in the balance sheet) has begun to show a fairly large amplitude

¹⁸ Short-term deposits are defined here as the sum of current deposits, ordinary deposits, deposits at notice and special deposits—including bank deposits held by the government—.

¹⁹ See *Money-Flow—the Theory and its Application*—(in Japanese), edited by A. Koizumi, Tokyo, 1960, pp. 79–80.

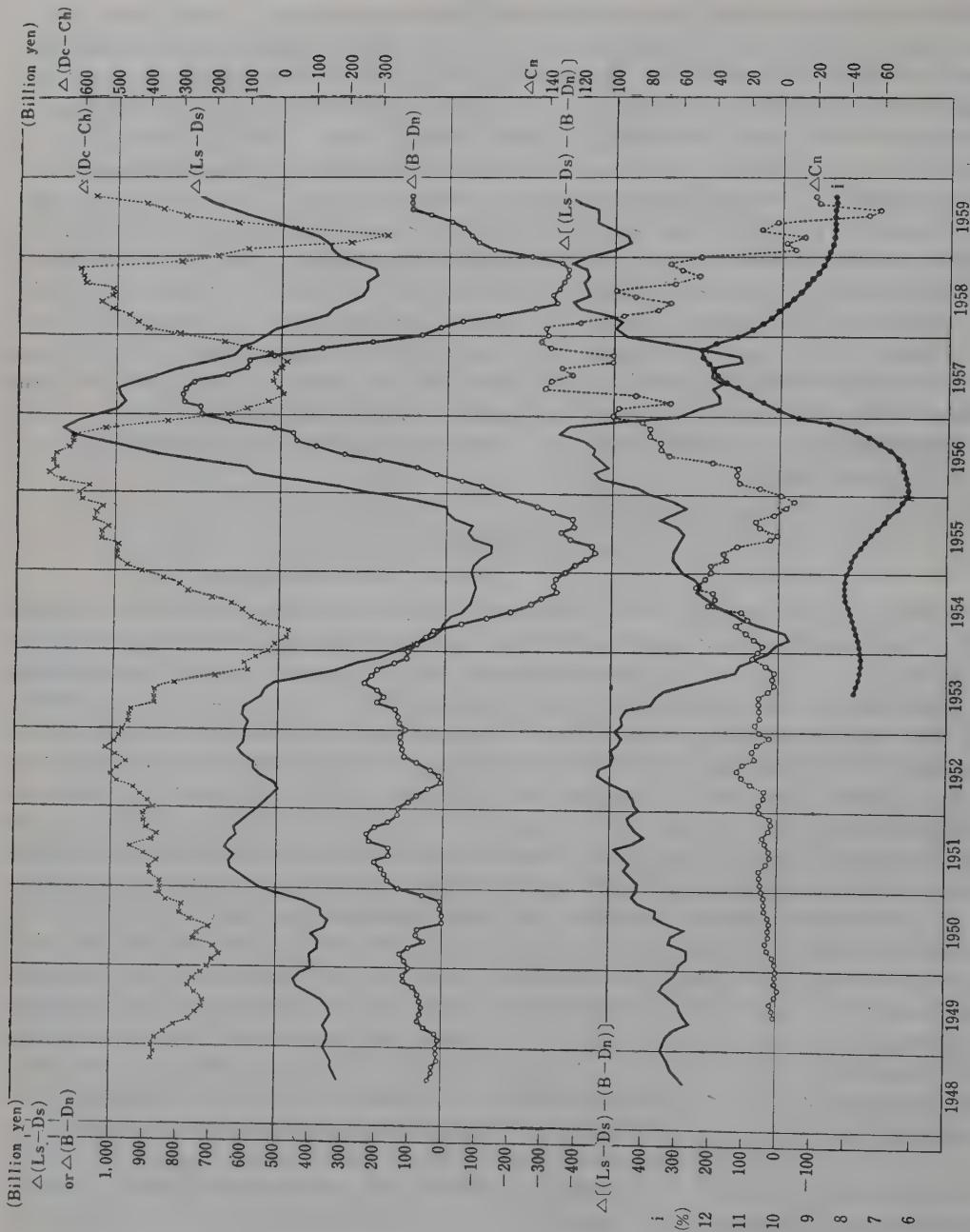


Fig. 7

of fluctuation since 1954. Generally speaking, commercial banks as a whole are borrowers in the call market, while the lenders consist of the Central Cooperative Bank of Agriculture and Forestry, Prefectural Credit Federation of Agricultural Cooperations, Agricultural Cooperative Associations and so on. Among the commercial banks, the rural banks have always been lenders while the city banks have always been borrowers in the call market, as pointed out in footnote 8). But, for simplicity, let us look at the matter in terms of all commercial banks. Then the increase in the net call money in all banks ΔC_n , lags behind $\Delta(B - D_n)$. It shows that when banks, particularly the city banks, can no longer depend on borrowings from the Bank of Japan in the later stage of the boom, they try to tide over the drain of cash reserves by absorbing the idle funds still existing in rural areas. It vividly mirrors the situation where the city banks take advantage of call money as a substitute for loans from the Bank of Japan in order to remedy the difficulties arising from excessive lending. Thus, it is natural that the call rate i should rise higher than the interest rate on loans. Since August 1955, when the ceiling rate on call funds was abolished, there is a positive correlation with ΔC_n as observed in Fig. 7.²⁰

The above statistical investigation seems to give strong empirical support for our simple model explaining the behavior of the bank and the bank's supply of money.

²⁰ The call rate here is represented by that on unconditional loans in Tokyo.

A NATIONAL BUDGET MODEL FOR ECONOMIC PLANNING*

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I. *The General Framework of Economic Planning*

It appears that the guiding principle in current economic policy is shifting from the *laissez faire* to state guidance or control. The latter, whatever it is form and however defined, is based on the conviction that state guidance or control of the economy is essential for stable growth. In addition to growing government control, the share of general government in the economy as a whole is constantly increasing in developed countries. The general government contributes a big share not only of the administrative work but of the general economic activity. As a consequence, the state has been taking deliberate measures to change economic conditions, for it is now aware of its own important role in the economy. The process of decision making by the central government in its effort to national economic welfare, otherwise social welfare, and the method devised to implement these decisions are here termed economic planning.

For the analysis of economic planning, it seems necessary to make a distinction between two successive stages in government decision making. These are the *stage of prediction* and the *stage of planning*. Before going into a more detailed investigation of government decision making in these two stages, four categories of variables which produce changes in the economic system are classified according to the terminology developed by J. Tinbergen in his contribution to the theory of economic policy.¹ His four categories of economic variables are target variables, instrument variables, data variables and irrelevant variables, respectively. Target variables are those variables which the central government considers strategically crucial for the national economic welfare. A certain degree of favourable current balance in international payment, an employment level, and stable prices may be cited as examples of target variables. Instrument variables are those vari-

*The central portion of this paper is based on the author's previous work published in Japanese: "National Budget Model in Economic Planning", *Keizai Kenkyu*, October 1957, which was an outgrowth of a joint study in the Research Group on the Method of Economic Planning organized by the Economic Planning Agency and headed by Professor Yuzo Yamada at the time the Five Year Plan for Economic Self-support was under preparation. A recent development in Japanese economic planning is the New Long-Range Economic Plan (1961-1970), for which a useful theoretical framework is presented by Professor Kazushi Ohkawa. See his, "The Use of National Income Accounts for Long-Range Planning in Japan", (mimeographed paper which is to be presented at the 1961 conference of the International Association for Research into Income and Wealth). The author wishes to acknowledge Professor K. Ohkawa's comments on this paper. He is also grateful to Dr. Harry Oshima who has improved his English draft.

¹ In particular, see: J. Tinbergen, *On the Theory of Economic Policy*, 2nd Printing, 1955, Amsterdam; J. Tinbergen, *Economic Policy ,principle and design*, 1956, Amsterdam.

ables which are under the control of the central government. Direct tax rates, the level of government expenditures are examples of instrument variables. Data variables are variables whose changes are regarded as data by the central government. For example, the amount of exports, the price level of competing goods in world market are examples of data variables. Irrelevant variables are those variables which are not strategically relevant for government decision making even though they are important determining factors of the economic system. Consumer's purchases of goods and services, compensation of employees are examples of irrelevant variables. The specific grouping of economic variables under these four categories is relative to the nature of the economic welfare the central government has in mind. An economic variable, say gross capital formation, may be a target variable in one case, but in another case it may belong in the category of irrelevant variables. The logical construction put upon these four categories of economic variables is termed a policy model. What is of primary importance in the construction of policy model is that the central government is clear about which variables are target variables and instrument variables.

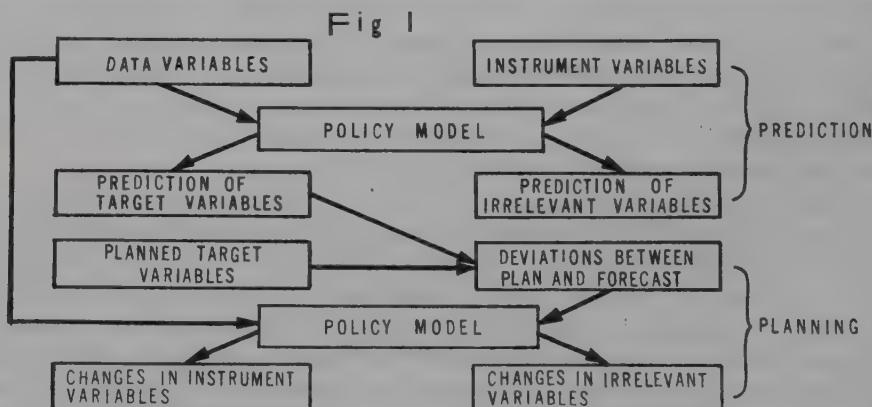
Presupposing the existence of a policy model, the central government in the stage of prediction is interested in the movement of target variables resulting from a hypothetical action of instrument variables initiated by the central government. The impact of changes in instrument variables on target variables can be worked out by solving mathematically a policy model for target variables and irrelevant variables in terms of hypothetical instrument variables and expected data variables. If a policy model is a linear system, the necessary condition of solving for target variables and irrelevant variables is that the number independent equations is equal to the number of target variables plus irrelevant variables. The decision making of the central government in this stage is specified as 'prediction', because the movements of target variables are predicted by the hypothetical changes in instrument variables. Accordingly, the prediction of target variables in this way will be a conditional prediction,² since it is conditioned to hypothetical changes in instrument variables and expected movement of data variables.

Once the movement of the target variables has been predicted, the central government, in the next stage of decision making, proceeds to make calculations to determine whether the predicted development of target variables is favourable for national welfare. Here, it is assumed that the central government has a definite measure of national economic welfare, the so called social welfare function, and that according to this measure there exists a set of target variables with fixed values which maximize the national economic welfare. The set of values of target variables fixed so as to maximize the national economic welfare is called a set of optimal values of target variables. Analogous to the fixed target policy in Tinbergen's theory the economic planning considered here is characterized as economic planning with fixed targets, or in short fixed target planning. Fixed target-planning can be contrasted with flexible target planning. The latter is defined as economic planning in which target variables are allowed to move freely so as to maximize the national economic welfare, in which the target variables act as independent variables. In the case of flexible target planning it is necessary to specify the quality of national economic welfare, or in other words to measure the social welfare function of the central government. The

² The definition of conditional prediction follows the idea developed by H. Theil in *Economic Forecasts and Policy*, 1958, Amsterdam, ch. II.

fact that the method and data required to derive quantitatively the social welfare function are not satisfactorily developed prevents us from pursuing further the idea of flexible target planning³. As a general tendency, the optimal values of target variables may not coincide with the predicted values of target variables. If there is any discrepancy between the optimal values and predicted values of target variables, the central government will attempt to eliminate this discrepancy by means of instrument variables. The procedure in this government decision making is just the reverse of that in the stage of prediction. To simplify the matters, it is assumed that there exists no discrepancy between the expected values for data variables in the successive stages of government decision making. The movement of instrument variables and irrelevant variables measured either from the hypothetical values or from predicted values are solved in terms of the discrepancy between the optimal values and predicted values of target variables by means of a policy model. The necessary condition for the solution is that the number of independent equations in a policy model is equal to the number of instrument variables plus irrelevant variables. Consequently, the number of target variables should be equal to that of instrument variables in order that the government action for removing the discrepancy between optimal values and predicted values of target variables may be consistent with the government decision making in the stage of prediction. As this solution for the movement of instrument variables indicates a programme to restore the optimal targets, the government's decision making in this stage may be expressed by the term, "planning".⁴

The logical structure of the successive stages of government decision making is represented diagrammatically by (Fig. 1)



³ Theil has developed the idea of a quadratic form of social welfare function and applied it to the optimal decision making of the central government. See his *Economic Forecast and Policy*, ch VIII. Frisch has tried to derive a social welfare function from interview data in his paper: "Practical Rules for Interview Determination of One-sided and Two-sided Preference Coefficients in Macroeconomic Decision Problems", Memorandum fra Sosialøkonomisk Institutt, Universitetet i Oslo, 25 June 1959. The present author will take up the point in another paper.

⁴ The distinction between "prediction" and 'planning' is significant because the central government can adapt itself in the planning stage to a situation which presumably will bring unexpected changes in both data variables and irrelevant variables and will also cause discrepancies in those variables as between predicted and actual values.

II. Construction of a National Budget Model

The following notations are used in the subsequent analysis:

GNP	gross national product
B	purchases of goods and services from the rest of the world
GI	gross domestic capital formation
C_h	consumers' expenditure on goods and services
C_g	government current expenditure on goods and services
A	sales of goods and services to the rest of the world and net factor income from the rest of the world
W	compensation of employees
E	proprietors' income
R_h	income from property accruing to households minus interest on consumer's debt
R_g	government income from property and entrepreneurship minus interest on the public debt
IT	indirect taxes
P_c	depreciation and other operating provisions plus saving of corporations plus direct taxes on corporations
Z	subsidies
DT_c	direct taxes on corporations
S_c	saving of corporations plus depreciation and other operating provisions
DT_h	direct taxes on households
DY	disposable income
F	current net transfers from government to households
S_h	saving of households
S_g	saving of government
AS	current surplus from the rest of the world

The national budget model that is discussed below consists of three groups of equations:

- (1) the system of national accounts
- (2) behaviour equations
- (3) target-setting equations.

II. 1. The system of national accounts

The system of national accounts has not yet been completed in Japan, even though the Economic Planning Agency annually publishes the series of national income and its components, in which attempts are also made as far as possible to present constituent parts of national accounts. Without going into the details of measurement, a fully articulated system of national accounts is constructed with the aid of scattered informations on national accounts appearing the *National Income Year Book*, published by Economic Planning Agency.⁵

⁵ The procedure followed in the construction of national accounts is briefly mentioned here. Account (1) comes directly from the table, "Kokuminshotoku to Kokumin Keizai Keisan" (National Income and National Economic Accounting). In order to construct account (2), national income at factor cost is converted to GNP in the table, "Bunpai Kokuminshotoku" (National Income as Distributive Shares). Accounts (4) and (5) are derived from the table, "Kiojin Shotoku to sono Shobun" (Personal Income and its Appropriation). Account (6) is based on the table, "Zaisei Shushi" (Government Receipts and Expenditure). Account (8) follows from the table, "Kaigai Shushi" (Receipts and Expenditure in the Rest of the World). From the accounts (1)–(6) and (8) the account (7) is derived.

All figures appearing in the national accounts are annual figures and refer to the fiscal year.

- 1) national product and expenditure account

$$GNP + B = GI + C_h + C_g + A \quad (1)$$

- 2) income formation account

$$W + E + R_h + R_g + IT + P_c = GNP + Z \quad (2)$$

- 3) appropriation account for corporations

$$DT_c + S_c = P_c \quad (3)$$

- 4) income redistribution account of households

$$DT_h + DY = W + E + R_h + F \quad (4)$$

- 5) appropriation account for households

$$C_h + S_h = DY \quad (5)$$

- 6) appropriation account for government

$$F + Z + C_g + S_g = R_g + DT_c + DT_h + IT \quad (6)$$

- 7) capital formation account

$$GI + AS = S_c + S_h + S_g \quad (7)$$

- 8) rest of the world account

$$A = B + AS \quad (8)$$

This system of national accounts is closely related to the system devised by I. Ohlsson in the construction of the national budget of Sweden. It is slightly different from the OEEC's *A Standardized System of National Accounts* (1958 edition).⁶ But it is easily seen that a system of national accounts similar to the OEEC's system can be derived from 1)-8) by keeping 1), 6), 7) and 8), and by consolidating 2) with 3), 4) with 5) respectively.

Because of the nature of a fully articulated system of national accounts, the independent relations in the system of national accounts are 7 instead of 8, which is the number of accounting relations in the national accounts.

II. 2. Behaviour equations

As a first approximation to reality, the choice of simple behaviour equations is of fundamental importance for two reasons. First, a national budget model simple in character enables us to discover easily the causes of the deviations between predicted values and actual observation. Second, the causal relationships which determine the development of variables in the national budget are easily revealed in a simple national budget model. Simplicity in behaviour equations implies two things. One refers to the number of explanatory variables. The fewer the the number of explanatory variables in a single equation is, the simpler it becomes. The other relates to the form of the functions. In this connection it is believed that the linear form of functional relation is a good approximation to reality, at least for the explanation of changes in an economic system in the neighbourhood of equilibrium. However, it may be pointed out that the use of simple behaviour equations prevents the introduction of greater degree of autonomy. As a compromise between the two extremes, i.e. simplicity and autonomy in behaviour equations, it is decided that the following behaviour equations are presented with due consideration to the problem faced in the construction of any model.⁷

- 1) consumption function

⁶ See: I. Ohlsson, *On National Accounting*, 1953, Stockholm; OEEC, *A Standardized System of National Accounts*, 1958 edition, 1959, Paris.

⁷ Relevant variables appearing in the national budget model are expressed in constant prices (1955 = 100).

The consumption function is assumed to be a linear, homogeneous function of disposable income:

$$C_h = \alpha D Y \quad (9)$$

2) import function

Here, the import function is assumed to be a linear, homogeneous function of GNP:

$$B = \mu G N P \quad (10)$$

3) corporate saving function

Corporate saving is determined by corporate profits. The former is assumed to be a linear, homogeneous function of the latter:

$$S_c = \sigma P_c \quad (11)$$

II. 3. Target-setting and the underlying assumptions

In stead of fixing the values of the targets variables, the target setting equations are introduced into the national budget model. The target setting equations depend upon the target variables in the central government. In the case of Japan's Five Year Plan, the objectives cited in the Five Year Plan are taken, translating them into target setting equations. However, the objectives cited in the Five Year Plan are not concrete enough to be written in the form of equations. The Five Year Plan states that it aims to establish a) the stability of the economy, b) self-dependent economy and c) the full employment. The implications of each of the objectives, particularly the first two, are so pregnant that we are at a loss to find a method of giving them mathematical expressions. So it is simply assumed that both the stability of economy and the full employment are attained with a given level of GNP and that a self-dependent economy will materialize when the current deficits in the balance of payments disappear. The way of target setting does not seem to differ much from the tacit assumptions underlying the Five Year Plan.

The first assumption is shown by equation (12), and the other by equation (13), where GNP* stands for the GNP which fulfils the objectives a) and c). GNP* is assumed to be predetermined by the central government.

$$G N P = G N P ^ * \quad (12)$$

$$A S = O \quad (13)$$

An underlying assumption of the Five Year Plan is that no change takes place in the price structure. Therefore we exclude complications arising from changes in relative prices.⁸

Since the Five Year Plan is concerned mainly with prediction, it does not say much about the means by which the Plan is to be realized. Following our terminology, it means that the Five Year Plan does not specify the instrument variables. Without departing too far from the implications of the Five Year Plan, the following variables:

$$D T_c, D T_h, I T, R_g, Z, F, C_g$$

are regarded as predetermined variables. Hence, in the sense that these variables are under the control of the central government they belong to the category of instrument variables. It should be noted that the government saving is not the case. As the government saving forms a part of the budget balance, however defined, it cannot be regarded as the variable which is under the government's control.

Consequently, equations (1)—(13) determine the twelve endogeneous variables, namely
 $G N P, A, B, A S, (W + E + R_h), P_c, S_c, D Y, C_h, S_h, S_g, G I$

⁸ As a result of the assumption only the GNP deflator is used to derive variables expressed in terms of constant prices.

remembering the fact that the accounting system in 2.1. is fully articulated.

II. 4. The solution of a national budget model

A reduced form, in which the above mentioned twelve variables are solved in terms of the target variables and predetermined variables, is derived from equations (12)–(23)

$$A = \mu GNP^* \quad (14)$$

$$B = \mu GNP^* \quad (15)$$

$$P_c = \frac{1}{1-\sigma} DT_c \quad (16)$$

$$S_c = \frac{\sigma}{1-\sigma} DT_c \quad (17)$$

$$W + E + R_h = (GNP^* + Z) - \left(\frac{1}{1-\sigma} DT_c + R_g + IT \right) \quad (18)$$

$$DY = (GNP^* + Z + F) - \left(\frac{1}{1-\sigma} DT_c + R_g + IT + DT_h \right) \quad (19)$$

$$C_h = \alpha \left[(GNP^* + Z + F) - \left(\frac{1}{1-\sigma} DT_c + R_g + IT + DT_h \right) \right] \quad (20)$$

$$S_h = (1-\alpha) \left[(GNP^* + Z + F) - \left(\frac{1}{1-\sigma} DT_c + R_g + IT + DT_h \right) \right] \quad (21)$$

$$S_g = (R_g + DT_c + DT_h + IT) - (F + Z + C_g) \quad (22)$$

$$GI = (1-\alpha) GNP^* + \frac{\sigma}{1-\sigma} DT_c - \alpha [(Z + F) - (R_g + IT + DT_h)] - C_g \quad (23)$$

III. Predicting the Economy in 1960

III. 1. Estimation of parameters

The national budget model in the preceding section has three parameters which must be determined by statistical data. Without getting involved in the familiar discussions on how to estimate unbiased parameters for an econometric model, three parameters are determined by simply taking the average ratio of α , μ and σ between 1951 and 1956.⁹ Thus, the three parameters are:

⁹ As alternatives to behaviour equations (9)–(11), the following forms may be used:

$$C_h = \alpha_0 + \alpha_1 DY \quad (9)''$$

$$B = \mu_0 + \mu_1 GNP \quad (10)''$$

$$S_o = \sigma_0 + \sigma_1 P_o \quad (11)''$$

where α_0 , α_1 , μ_0 , μ_1 , σ_0 , σ_1 , are parameters to be estimated by statistical data. Using the national accounts figures for the period between 1951 and 1955, and the least squares method

$$C_h = -40.5 + 0.86 DY \quad (9)''$$

$$(0.002) \quad (10)''$$

$$B = 384.0 + 0.065 GNP \quad (10)''$$

$$(0.041)$$

$$S_o = -317.9 + 1.1 P_o \quad (11)''$$

$$(0.001)$$

where the figures in parenthesis stand for the standard error of each estimate adjusted for degrees of freedom.

$$\alpha=0.85 \quad (24)$$

$$\mu=0.12 \quad (25)$$

$$\sigma=0.75 \quad (26)$$

III. 2. Determination of predetermined variables

In order to draw up the 1960 economy in Japan from the national budget model, the predicted (1960's) figures for the predetermined variables must be given. Five Year Plan does not show the components of government current account except the item named 'government purchases'. Since the definition of 'government purchases' is ambiguous in the Five Year Plan, the following is devised. As a target figure, we know the 1960 value of GNP from the Five Year Plan, see equation (12). For each year between 1951 and 1955, the ratio

$$DT_c + DT_h + IT + R_g/GNP$$

is calculated from the data in our national accounts constructed. Taking the average of the ratio of the five years between 1951 and 1955, we get

$$E_x(DT_c + DT_h + IT + R_g/GNP) = 0.196$$

where E_x stands for a mathematical expectation. Letting the 1960 value of GNP stand for GNP^* , the current revenue of government in 1960 is given by

$$GNP^* \times 0.196$$

The total of the government current account is divided components on the basis of proportions worked out from components in the 1954 government current account. An implication of this method is that the proportions of the various components in the government account in 1960 will not significantly change from those of 1954. As 1954 is the year when the Five Year Plan was drafted and the Economic Planning Agency did not foresee a big change in the government expenditure pattern for the planning period, the method does not seem to differ much from what the Five Year Plan amounts to.

III. 3. Determination of the target variable

The Five Year Plan gives two alternative values for the target variables. These are (in 1955 constant prices):

$$(CASE\ I) \quad GNP^*=9,673.0 \text{ (billion yen)}$$

$$(CASE\ II) \quad GNP^*=11,489.0 \text{ (billion yen)}$$

These alternative targets stem from the desire for flexibility in economic planning allowing for a range of potential growth. Corresponding to the two alternatives of GNP values in 1960, we have two sets of predetermined variables for 1960, which are tabulated below.

TABLE I (billion yen)

(CASE I)	(CASE II)
DT_c	341.2
DT_h	544.1
IT	997.2
R_g	13.4
C_g	1,126.2
Z	20.9
F	216.1
	405.3
	646.3
	1,184.4
	15.8
	1,337.6
	24.8
	256.8

III. 4. Prediction of endogenous variables

If we insert the values of the parameters, predetermined variables and target variables

into the reduced forms derived in the previous section ((12)–(23)), predictions of the twelve variables in 1960 are obtained, which are tabulated in (TABLE II). As the table shows, two alternative predictions result, corresponding to two alternative values of the GNP.

TABLE II

CASE I		CASE II	
Billion yen	% increase from 1955	Billion yen	% increase from 1955
P_o	1,364.8	121.78	1,621.2
S_o	1,023.6	115.49	1,215.9
A	1,160.8	110.10	1,378.7
B	1,160.8	127.14	1,378.7
$W+E+R_h$	7,318.5	115.40	8,881.6
DY	6,990.5	115.59	8,492.6
GI	2,604.9	121.12	3,122.5
C_h	5,941.1	117.90	7,218.2
S_h	1,048.6	104.02	1,273.8
S_g	532.7	—	632.8

III. 5. A national budget in 1960

Making use of predictions for 1960, a 1960 national budget which gives ex-ante figures of the economy in ex-post form, is easily derived. This is a form of the so called "the national budget as an 'engineering' forecast".¹⁰

The national budget shows figures appearing in the Case I above.

national product and expenditure a/c

GNP	9,673.0	CI	2,064.9
C_h		5,941.9	
C_g		1,126.2	
A		1,160.8	
$-B$		-1,160.8	

income formation a/c

$W+E+R_h$	7,318.5	GNP	9,673.0
R_g	13.4		
IT	997.2		
$-Z$	-20.9		
P_o	1,364.8		

appropriation a/c for corporations

DT_o	341.2	P_o	1,364.8
S_o	1,023.6		

¹⁰ In particular, see: B. Hansen, *The Economic Theory of Fiscal Policy*, 1958 Stockholm, pp 379–380.

income redistribution a/c of households

DT_h	544.1	$W+E+R_h$	7,318.5
DY	6,990.5	F	216.1

appropriation a/c for households

C_h	5,941.9	DY	6,990.5
S_h	1,048.6		

appropriation a/c for government

F	216.1	R_g	13.4
Z	20.9	DT_e	341.2
C_g	1,126.2	DT_h	544.1
S_g	532.7	IT	997.2

capital formation a/c

GI	2,604.9	S_e	1,023.6
AS	0	S_h	1,048.6
		S_g	532.7

rest of the world a/c

A	1,160.8	B	1,160.8
		AS	0

IV. Concluding Remarks

The foregoing discussion was mainly focussed on the prediction of the 1960 economy. A national budget model was constructed so that the predicted figures could be given in a consistent basis. What is of fundamental importance for a prediction of economy is consistency in the predicted figures. As we have seen in the previous section, a national budget based on a national budget model supplies consistent figures for the economy. Going a step further, a national budget model is employed as a policy model in the planning stage. The specification of instrument variables in the Five Year Plan, which is essential in the planning stage, appears to be less clear than in the case of target setting. This prevents us from working out empirically the planning stage of the Five Year Plan.

The estimation of parameters in the national budget model is based on a simple and rough method. A more sophisticated approach may be recommended by the econometrician.¹¹ A shift of weight in manufacturing industry from the cotton textile industry

¹¹ The two-stage least squares method developed by H. Theil and his followers seems to be a powerful method for the estimation of parameters in the policy model. For an account of the two-stage least squares method, see: H. Theil, *op.cit.*, pp 205-229 and 334-361.

to the chemical and machinairy industries, which is gradually taking place in Japan, may shift the import function, and thereby affects the parameter in the import function. Taking into account this kind of structural changes on the economy, a tolerance range may be put into the estimation of parameters in the national budget model. A simple method is to provide a range in the estimates of parameter.

A national budget describes the economy from the macroscopic viewpoint. The breakdown of a prediction by industry levels may be of interest as a complement to the results of prediction. The connection of the input-output model to the national budget model suggests a fruitful approach to this issue. Suppose that the total of the components of final demand in the input-output model is given by the national budget model and that the total of each componont is distributed to each industry so that vectors of the components of final demand may be constructed. The prediction of output by industry is easily calculated from the input-output model. What is of primary importance in the use of input-output model in this manner is the stability of input coefficients and the construction of the vectors of final demand. To the extent that the input coefficients are subject to change the application of the input-output model for prediction purposes may be difficult. In the same way, some arbitrary elements are ineviatbly involved into the construction of the vectors of final demand, unless enough informations are supplied, so that a prediction of outputs by industry level by means of the final demands vectors may be hampered. Accordingly, the acccumulation of the necessary data and information for these purposes is urgent before we begin to apply the input-output model for the prediction.¹²

¹² For a computation of industrial output for 1960 using the national budget model above and an input-output model see: Y. Kurabayashi and K. Imai, "The Five-year Economic Plan and Electric Power Industry", Investigation of the Electric Power Industry in relation to the Structure of Japanese Economy, *Thechnical Report of the Central Research Institute of Electric Power Industry*, June 1957, Tokyo.

FREEDOM AND ECONOMIC THEORY

—Second research report on Menger's unpublished paper¹—

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I. *Carl Menger's Library*

The Menger library is more than 100 years old. Carl Menger's father, a small-town lawyer in former Austrian Poland, collected the first 4,000 volumes.² Carl Menger, who was a famous economist, an avid reader and a book collector, enlarged the collection to 25,000 volumes. After his death the works dealing with the social sciences were acquired by the Japanese government and are kept at the Hitotsubashi University, Kunitachi, Tokyo. The books by themselves are of great literary and scientific value; they are especially important for the historian of economic thought, because they contain essential parts of Menger's scientific legacy.

Menger's collection reflects his working habits, his thinking, and his personality. He wrote corrections, short notes, and fragmentary essays on the flyleaves, margins and other empty spots of the books he owned. More often than not these notes have only an indirect connection with the printed text. They are monologues by which he clarified and developed his own thoughts. Most important are his notes in Rau's *Grundsätze der Volkswirtschaftslehre* and his copy of his own Principles of 1871. Menger's remarks in Rau's handbook (abbreviated: Rm.) contain an early version of his theories of value, price, and money. Menger's hand copy of his theory of 1871 (abbreviated: fragment) includes an unfinished correction of this work which was planned as an introduction for a four-volume handbook. He wrote his corrections on inserted sheets as well as on the printed pages. I have transcribed the two manuscripts, but only the notes in the fragment are mimeographed. The following list gives a selection of those books in which I found Menger's comments. It also indicates that the search is not finished; ample material still has to be investigated.

Selection of Menger's annotated books.

A. Books investigated.

1. Joseph Kudler, *Die Grundlehren der Volkswirtschaft*. Vol. 1. Wien 1846. Apparently used by Menger for his state-examination, 1860–1863. (Menger library Comp 168)

¹ First report: Kauder, "Menger and his library", *The Economic Review*. Hitotsubashi University. Vol. 10.

² About Carl Menger's family: l.c. *Biographisches Jahrbuch und deutscher Nekrolog* loc. cit. Bettelheim. Vol. XI Berlin 1908 "Anton Menger" by Carl Grünberg. P.3 et seq. About the origin of Menger's library: Ismar Feilbogen, "L'Ecole Autrichienne d'Economie politique. *Journal des Economistes* 70 th year. Vol. XXXI, Paris 1911. P. 56. Footnote. Letter of Carl Menger to Ismar Feilbogen.

2. Karl Friedrich Rau, *Grundsätze der Volkswirtschaftslehre*. 7th edition. Leipzig 1863. Menger remarked twice (title page and page 1) that he started his study of Rau September, October 1867. (Mlb. Comp. 266.) (title abbreviated Rm.)
 3. Menger, *Grundsätze der Volkswirtschaftslehre*. Wien 1871. The author's copy. Menger changed the title to *Allgemeine theoretische Volkswirtschaftslehre*. Attached newspaper clippings indicate that Menger started to work about 1873. He may have stopped writing on this manuscript after 1892, because a note on the cover asks the honest finder to deliver the book to Menger against the reward of 100 Kronen. The crown currency was introduced in Austria in 1892. (Abbreviated title: Fragment).
 4. John Stuart Mill, *Grundsätze der politischen Oekonomie*. German translation by Adolph Soetbeer. Hamburg 1864. Read by Menger after he had published his Principles. Important notes about price and the law of diminishing return. (MLb. Eng. 983)
 5. Friedrich Ueberweg, *Grundriss der Geschichte der Philosophie der Neuzeit*. Berlin 1872. Read before he published his methods of social sciences. See Kauder, Menger and his library, *The Economic Review*, Hitotsubashi University, Vol. 10 January 1959. No. 1.
 6. Hermann Heinrich Gossen, *Entwickelung der Gesetze des menschlichen Verkehrs*. Braunschweig 1854. Rare first edition. (Comp 99) Menger read this book summer 1886. See remark in ink on titlepage. Very important for Menger's attitude to Gossen.
 7. Rudolf Auspitz und Richard Lieben, *Zur Theorie des Preises*. Leipzig 1887. (Mlb. Mon 91) This is the only mathematical treatise in the whole library which Menger had thoroughly studied.
- B. Books, pamphlets and other material existing but not available.
1. Notes on the theory of value 1867, mentioned in F.A. von Hayek, "Carl Menger." *The collected works of Carl Menger*. Vol. 1. The London School of Economics and Political Science. London 1934. P. XI Footnote. I could not find out whether or not these notes are identical with the Rm.
 2. Preface intended for a second edition of the principles, partly published in Carl Menger, *Grundsätze der Volkswirtschaftslehre*, 2nd posthumous edition, Wien 1923. Preface by Richard Schüller, ed. by Karl Menger (son). (Abbr. Sch. M.) P. VII et seq.)
 3. Carl Menger's paper "Kritik von Wundts Logik". Sch.M. P.XIII. Owned by Karl Menger?
 4. Correspondence Carl Menger-Boehm-Bawerk. Partly published Sch.M. XII and *Economisk Tidskrift*. Upsala 1921.P. 87 et seq.
 5. Menger's remarks to Knapp, *Staatliche Theorie des Geldes*. According to a letter by Oskar Morgenstern, Ludwig von Mises deposited this book at the University library, Geneva, Switzerland.
 6. Original manuscripts of the Sch.M. Property of Karl Menger?

II. *Results of my Research*

Twice I visited the Menger library. The first short visit of 1958 produced the following results:³

1. Menger's Aristotelian background. I collected additional material reaffirming my thesis that Menger's methodology of the social sciences was influenced by the Aristotelian metaphysics and logic.⁴

2. Menger's so-called plagiarism. The ugly reproach that Menger stole his ideas from Gossen (Pantaleoni) or from Mangoldt (Weinberger) could be disproved.

3. The Austrian roots of Menger's economy. A connection between Menger and Joseph Kudler, the foremost defender of classicism in Austria, could be established.

The second visit, September 1960 till July 1961, added new discoveries:

1. Menger's relation to earlier and contemporary economists. 2. A social philosophy existing prior to the *Untersuchungen* of 1883. 3. Menger's ideas about value, price and money before 1871. 4. Unfinished thoughts about many aspect of economic theory. Menger interlarded his reflections with many quotations. He argued his case before the theorists. His reasoning cannot be understood without knowing the economists he accepted or rejected. Therefore I begin this progress report with Menger's attitude to earlier and contemporary economists.

III. *Menger and the Economic Literature*

In an earlier paper I have already described the literary sources of the *Principles*.⁵ I deal here mainly with Menger's later studies of old and new economists.

Menger patterned his planned four-volume handbook after the big systems of Roscher and Rau. Following these models he compiled a huge amount of quotations. In the fragment 145 authors are mentioned:⁶ all the eminent writers from Aristotle to Jean Baptiste Say, the Socialists Proudhon and Karl Marx, the leaders of the older historical school, Knies and Roscher. It is understandable that Menger wanted these names in his new edition. Very strange, however, is the preferred treatment of second class epigones of classicism, especially Rossi,⁷ and Peshine Smith,⁸ an otherwise unknown follower of Carey. In the fragment Ricardo has been quoted 15 times, while Peshine Smith is mentioned 27 times and Rossi even 55 times. The names of Jevons and Walras, who discovered the marginal utility theory simultaneously with Menger, are not found in the whole manuscript! It is not surprising that the works of his own students are not included in the literature;

³ See Kauder, "Menger and his Library," loc. cit.

⁴ Same author, "Intellectual and Political Roots of the older Austrian School" *"zeitschrift für Nationalökonomie*. Vienna 1958. Vol. XVII P. 411 et seq.

⁵ Kauder, "Menger and his library," loc. cit.

⁶ My calculation

⁷ Count Pellegrino Rossi, 1787-1848. *Cours d'économie politique*. 1839 and later.

⁸ Peshine Smith fl. 1853. Menger used: *Manuel d'Economie Politique*, Paris 1854. Mlb. Eng. 1448.

they did not publish before 1880. Only Boehm-Bawerk is mentioned, most likely a later addition.

It seems that a great part of this collection was a waste, especially the excerpts from Rossi and Peshine Smith. Menger did not learn anything from them, but he used up much time, paper and effort to correct their errors. About 1900 even he became convinced that he quoted the wrong literature; therefore he played, at least for a time, with the idea to reprint the first edition of his *Principles* unchanged.⁹

Already before 1900 he began to study those writers whose ideas had some bearing on his own discoveries. In an earlier paper I described his encounter with Gossen. According to his son Menger studied Wundt.¹⁰ In a letter from June 26th 1911 to Ismar Feilbogen, Privatdozent at the University of Vienna, Menger wrote that Cournot had also influenced him and that he was interested in philosophy, mathematics and anthropology. This letter is a mystery. Menger owned the three economic works of Cournot: they were not read, before they arrived in Japan. Traces of Cournot can be discovered neither in his published nor in his unpublished work. Although I have found some very modest attempts to express theorems in form of equations and geometrical figures, Menger, at least between 1870 and 1890, was an outspoken opponent of mathematical economy.¹¹ Of all the contemporary mathematical economists he studied only Auspitz and Lieben.¹² To judge from the many question marks he did not approve of their pricetheory. It is possible but not probable that he changed his attitude to mathematics in his later years. But the Sch. M. contains only a few mathematical remarks.

His alleged interest in Cournot and mathematics remains a puzzle, but we need not question his predilection for ethnology and philosophy mentioned in the same sentence of the same letter. His fragment abounds with copious notes about technology and economics of primitive nations.¹³ That the author of a famous epistemology was very much interested in philosophy need not be proven. It was not known that his methodology is only a sector of a much more extensive philosophical investigation of which unfinished drafts are found in the Rm. and in the fragment.

IV. *Menger's Unpublished Social Philosophy*

Already in the Rm. Menger discusses philosophical questions. The first thirty pages of the fragment are dedicated to the same problems. Only a small part of the philosophical remarks in the fragment can be considered a first draft for the book of 1883. In the fragment Menger investigated mainly the connection between morals and economic action under the condition of personal freedom; in his methodological publication he justifies exact theory. In the fragment Menger is influenced by Cairnes and, strangely enough,

⁹ Sch. M.P. IX.

¹⁰ See list page 2.

¹¹ Etienne Antonelli, "Léon Walras et Carl Menger à travers leur Correspondance". *Economie appliquée*. Tome VI-1953. p. 269 et seq.

¹² See list.

¹³ Frequently he refers to Gustav Klemm, *Allgemeine Culturwissenschaft*. Part 1. Leipzig 1855 Part II. Sondershausen 1858 Mlb. 208.

by Lorenz von Stein. His epistemology is patterned after the Aristotelian ontology. Only one major aspect is common to the fragment and the book of 1883, i.e. the demand for a neutral theory. The defense of this postulate is more detailed in the fragment than in the published book.

In the fragment Menger demanded that economic analysis ought to be purified from ethical additions.¹⁴ Theory deals with the existing facts and not with right or wrong. The defenders of the Manchester doctrine, of social reform, as well as the socialists, mix theory with politics. The working class is against economics, because the laborers identify free competition with theory.¹⁵ This spurious identification, Menger claims, is due to people like Bastiat. This advocate of free economy justifies those facts which the socialists denounce as crying injustice. Menger was not the earliest defender of neutrality. He followed Cairnes who tried to separate politics from scientific economy.¹⁶

Like so many other adherents of value neutrality including Max Weber, Menger was not consistent. He had great sympathy for the poorer and classes was not the person who could merely register facts and keep his emotions under control. Besidess his idea of freedom contradicted the postulate of value neutrality.

Freedom is the central idea of his social philosophy in the fragment. Menger belonged to the Austrian liberals.¹⁷ The men who led the March Revolution of 1848 and who later opposed the autocratic tendencies under Francis Joseph, demanded liberty for the Austrian citizens, who should be free to work out their own welfare. The all-pervading tutorship of Metternich's police state had to be abolished; the privileges of nobility, high clergy, and the army had to be reduced.

Quotations by Menger which prove his liberal partisanship have already been given in my first report.¹⁸ Menger underpinned his liberalism with a philosophy of social progress. Apparently Menger's thoughts were influenced by Lorenz von Stein's philosophy of history. Lorenz von Stein, Menger's older colleague at the University of Vienna, was not an Austrian by birth and tradition. He came from Slesvig Hollstein. His thinking was not rooted in the Austrian tradition but in the Hegelian philosophy. Like his teacher Hegel, Lorenz von Stein claimed that history is man's way to freedom. Freedom will be attained in an infinite and organic process. The absolute nature of freedom will be realized under special historical circumstances.¹⁹ In the fragment Menger worked freely with these ideas. One wonders why only faint traces of this reasoning can be found in his printed work. The suppression of these thoughts may be the outcome of Menger's growing aversion to Post-Kantian philosophy. In the unpublished preface of the *Principles*²⁰ he complains

¹⁴ Fragment. Written on the back of the dedication page. See also Menger, *Untersuchungen über die Methode der Socialwissenschaften und der Politischen Oekonomie insbesondere*. Leipzig 1883. P. 288/289.

¹⁵ Fragment. Inserted page before "Vorrede."

¹⁶ J.E. Cairnes, *Essays in political Economy. Theoretical and Applied*. London 1873. (Mlb. 243) P. 253. p. 260. Cairnes already demands that the economists preserves a "neutral attitude."

¹⁷ Fritz Valjavec, *Der Josephinismus*. Munchen 1945. p. 126 et seq.

¹⁸ "Menger and his library."

¹⁹ Carlo Schmid, *Lorenz von Stein. Die Grossen Deutschen*. Vol. V. Berlin 1958. P. 318 et seq. Lorenz von Stein, *Die Gesellschaftslehre*. Stuttgart. 1856. P. 236.

²⁰ See page 2 of this paper.

about the German philosophy after Kant and its dangerous influence on economic thinking.²¹ With these words Menger rejects his earlier theory of social progress. The self-realization of freedom is main theme of Hegel's philosophy of history and Hegel is the head of Post-Kantian School. Unfortunatley personal reasons may also have played a role in the elimination of this social philosophy. Time and again Menger held Stein up to ridicule.²² Menger could not poke fun out of Stein and at the same time accept the leading idea. For the understanding of Menger's work it would have been better if he could have overcome his pride and prejudice.

Menger's neutral science clashed with this idea of freedom. Menger's concept of freedom has a double meaning: he blends the theory of free decision with a social goal. Man can only be understood as a free acting person. The free man is not a reality but a goal realized in the future. If man *is* free, then economic laws can be explored without reference to moral values; if man still has to be liberated, then a policy must be indicated by which freedom will be reached. Science is connected with political goals and cannot be neutral. For Menger these two sides of freedom form a unity. In our presentation the two aspects are separated.

The economic theorist has to describe rules and laws of human behavior.²³ Menger claims that theoretical analysis reflects the uniform elements in man's action. This regularity is, according to him, the outcome of rational and free decisions. Menger identifies free will with *rational* action; therefore he does not see a contradiction between freedom and determinism. He defends his position against Buckle, the British historian, who denied the existence of free will in history with the help of the same argument, i.e. the uniformity of human action, which Menger used for the defense of free will. Menger illustrates his position with the marriage frequency. If during a period of great prosperity many people marry, then, so Menger argues, these young men and women use only their freedom of rational decision. If the opposite happens, if people during a boom do not marry, then this would be indeed a proof against the freedom of will, and in favor of some unknown natural law which provides a reasonable explanation for such a surprising phenomenon.²⁴

This detailed criticism of Buckle's position shows how much Menger was interested in this subject; in spite of this only a few traces can be found in Menger's written work: only once in his methodology of 1883 he claims that exact analysis presupposes a definite direction of the will of the acting person.²⁵ For the understanding of his work it would have been better if more of the Buckle debate had been transferred into his publications. His struggle with teleology and causality would have become more meaningful.

From the year 1867 till the end of his life Menger remains interested in the time sequence of social phenomena. Menger faces a dilemma: If man is free, then the chain of

²¹ "Die nach-kantische Philosophie mit ihren spekulativen Verirrungen hatte in der deutschen Gelehrtenwelt ein tiefes Misstrauen, nicht nur gegen die Ausartungen der Theorie, Gelehrtemvelt ondern gegen die Theorie selbst zurückgelassen." Sch. M. p. VII. Carl Menger's words from an unpublished preface. Austrian thinkers were often outspoken opponents of Hegel's philosophy. See Josef Nadler, GRILLPARZER. Wien, 1952. p. 205. 214.

²² See Menger and his library.

²³ Fragment. Blank pages in front of Vorrede. Notes on page VIII

²⁴ Fragment. Blank page facing p. VIII.

²⁵ Untersuchungen. Op. cit. P. 260. Footnote 145.

events is determined by the end or the purpose of human action; if man is not free, then cause and effect tie together social facts. In consequence of his general assumption Menger ought to choose teleology and reject causality. But Menger is not always consistent. In the Rm. he was not quite sure about the way he has to choose. In the end he accepted a middle position. In social science causality and teleology can exist side by side. Man can break the chain of causality, e.g. by the usage of the fruits of production and by intervention.²⁶ In the *Principles* he selected causality. In the fragment he changed his opinion; the word "causal" is replaced by the neutral term "connection."²⁷ Whether or not this word has a causal or a teleological meaning is not explained. Only much later Menger claimed that teleology and not causality joins together social phenomena. In the Sch. M. he wrote, that it is the function of natural sciences to explain causal connections, while the economist has to investigate the relation of goods created by the goals of acting men. Why Menger hesitated so long till he selected the only way consistent with his philosophy, is not quite clear. It is possible that his early Leibnitz studies about which Karl Menger jr. spoke to me are partly responsible for the compromise between the two forms of ordering in the Rm.. Leibnitz taught "that the theological-teleological and the physical-mechanical world views are not excluding each other but ought to be completely united." This description is a quotation from Ueberweg and is marked by Menger.²⁸

Menger's and Stein's philosophy of history may have also contributed to this long hesitation. If man is really free, only a teleological sequence of social facts and events can exist. But freedom for Menger as well as for Stein is only in the process of realization; its complete materialization lies in the future. Men are free if they are ends but not means and not economic goods like the slaves of classical times. But not all people of Menger's society have reached this stage. Married women and especially the members of the lower classes are still half-slaves. They are somewhat better off than they were in earlier times. Their chains are longer than previously. A poor girl has often only the choice between becoming a prostitute or a seamstress.²⁹ ³⁰ How will the poor people become free? We have to go back to the Rm. to find the answer.

Economic progress will improve the situation of the poor. The luxury of the rich hinders the advancement of the lower classes. Here the young Menger finds the root of social evil.³¹ "The more the rich people consume, the merrier one lives in the present disregarding future development. If the rich people did not live a gay life, all the workers would have good living quarters; there would be brick layers and carpenters instead of hair-dressers and whores." But the youthful reformer is at a loss to find well defined targets for his attacks. What is luxury and who are the rich people? His definition of luxury has some

²⁶ Rm. P. 113.

²⁷ Fragment. P. 7. The headline of §.2. "Ueber den Causal-Zusammenhang der Güter" is changed to "a) Betrachtungen über den Zusammenhang der Güter.". On this page several times the word "causal" is eliminated.

²⁸ Friedrich Ueberweg, *Grundriss der Geschichte der Philosophie der Neuzeit*, BERLIN 1872. (CMLB Philos. 24.) p. 120.

²⁹ It is amusing that Menger who had such strong sympathies for the poor has been accused by Bukharin of being a defender of Bourgeois class interests. Nikolai Bukharin, *The Economic Theory of the Leisure Class*. New York. 1927.p. 25 et seq.

³⁰ Fragment. Inserted papers before pp. 2 and 25.

³¹ Rm. p. 424. et seq. Menger's note covers the top of the page, the right margin, and is continued below the text.

resemblance with Veblen's conspicuous consumption. "Luxury is the application of more means than are necessary for achieving a purpose."³² But this kind of waste is not the exclusive vice of the rich; Menger must concede that poor people especially indulge in reckless spending.

The rich spendthrift had not been clearly described in the Rm. Menger had always some sympathy for the entrepreneurs, the capitalists and the bankers. Yet he did not like "die Cavaliere."³³ We can guess that he meant the scions of the high aristocracy. We can even improve on this guesswork. In the year 1878 an anonymous pamphlet was published in Munich: "The Austrian Nobility and its Constitutional Function. A word of warning to the aristocratic youth." The author strikes at the Austrian nobility, its laziness, its crude luxury, and its lack of education.³⁴ In 1906 it leaked out that the ill-fated Crownprince Rudolf had written this booklet and that the educator of the prince, Carl Menger, together with his brother, the famous professor of law and socialist, Anton Menger, had taken care of the publication.³⁵ It is the conjecture of Mitis, Gollwitzer, and my own, that Carl Menger had some influence on the text, because the young members of the high nobility are the "Cavaliere" or the rich spendthrifts of the Rm. and the vices in Menger's notes and in the pamphlet are similar.

It is wrong to give these attacks a social-revolutionary meaning. Menger recommends to substitute for luxury the old "capitalist" virtue of "abstinence." Saving steers consumption away from luxury to those consumer goods which are necessary for life. It is a consequence of his faith in freedom that Menger during his whole life time believed in the efficiency of private production and opposed socialism. This does not mean, however, that for Menger the undiluted free competition was the cure-all for all social evils. From Menger's scientific postulate "the methodical individualism" the conclusion was drawn that he is an unconditional defender of laissez faire. But his atomism forms the sociological basis of his economic analysis and not a political program.³⁶ He agrees with Cairnes that laissez faire is not a *scientific* principle but only a *practical* guide whose application is limited by many exceptions.³⁷ In the Rm. and in the fragment Menger demands that private egotism, the driving power behind free competition, must be prevented from encroaching on public welfare. Menger exclaims, that society cannot endure "the last consequences of private individual egotism."³⁸ One of the many examples in the fragment which illustrates this discrepancy between egotism and welfare, is quoted here: "Who produces rice powdered or whiskey during a famine may earn a huge profit, but the welfare of the community will

³² Rm. p. 437 Above the print.

³³ Rm. p. 437.

³⁴ *Der österreichische Adel und sein konstitutioneller Beruf. Mahnruf an die aristokratische Jugend.* Von einem Oesterreicher. München 1878.

³⁵ *Neue Freie Presse.* Wien. April 10th 1906. N. 14959. p. 11. See also Oskar Freiherr von Mitis, *Das Leben des Kronprinzen Rudolf.* Leipzig 1928. P. 37. Heinz Gollwitzer, *Die Standesherrn.* Stuttgart 1957. p. 188. I owe an apology to Professor Gollwitzer. He was of the opinion that Menger cooperated with Crownprince Rudolf in the writing of this pamphlet. In a letter to Gollwitzer I criticized his opinion. I acted without knowing the documents,

³⁶ Untersuchungen op. cit. 157 and p. footnote.

³⁷ Fragment back of dedication page "dass das Princip des Laissez faire keine wissenschaftliche Basis habe" Menger quotes here Cairnes, *Essays in Political Economy.* op. cit. pp. 244. 251

³⁸ Rm. p. 435. Upper right margin.

not be improved."³⁹ In the *Errors of Historism* Menger emphatically denies that he is a defender of the Manchester doctrine; he declares that in spite of his opposition to Schmoller he is in favor of socialre form (Kathedersozialismus).⁴⁰ The reasons behind his social sympathy and his attitude to teleology and causality can be understood now with the help of his social philosophy. Only one other result of my research has a significance comparable with the discovery of Menger's social ethics, the development of Menger's value theory.

V. The Development of the Value Theory

Menger told his friends and students that in 1869 when he was employed by the official "Wiener Zeitung" he discovered his solution of the value problem.⁴¹ Already on my first visit to the Hitotsubashi University I found out that this period of incubation lasted much longer.⁴² It must have begun when he was a student or a short time later. Joseph Kudler was one of his earliest teachers. Already in my first progress report I mentioned that Menger gained from Kudler's handbook some elementary knowledge of value. Menger underscored these remarks which had a great influence on the development of his thinking. For the sake of completeness Kudler's ideas which the young Menger accepted, are repeated here: Value indicates that a commodity serves a purpose. A hierarchy of values is determined by the different objectives for which goods are used. Purpose and rank have a great significance for Menger's later formulation of his theory. The third item which attracted Menger's attention, was the labor value theory. The notes of the Rm. disclose a changed Menger. The doctrines of the book are no longer accepted; they serve only as points of departure for Menger's own thinking. The remarks reveal independent judgement and original ideas. Here is a catalogue of Menger's new thoughts:⁴³

First. The labor value theory is discarded. Yet traces of the old doctrine can still be found. Second. He calls his own doctrine the law of quantity (Das Quantitatsgesetz), i.e. besides utility the quantity of the goods available determines value.

Third. Value has an individual character; it is a personal judgement derived from utility and quantity.

Fourth. Value cannot be measured; however it is possible to relate one value to another but this comparison is rather inexact.

Fifth. The imputation theory is almost completed. "The value unifies consumer and producer goods into one group."⁴⁴ The value of the producer goods is determined by the value of the finished products and the value of the finished products is based on the value judgement of the consumer. Here Menger turns upside down the classical sequence: Labor sacrifice→costs of production→value of finished product. He gives a formula by which the value of complementary producer goods can be distributed among the individual

³⁹ Fragment, inserted page after P. 164. There are also other examples.

⁴⁰ Carl Menger, *Die Irrtümer des Historismus in der deutschen Nationalökonomie*. Wien 1884. (Mlb. 2146) p. 83.

⁴¹ F. A. von Hayek, "Carl Menger" loc. cit. p. XI.

⁴² Menger and his library.

⁴³ Rm. p. 70.

⁴⁴ Rm. p. 416.

factors of production. "In the production the lack of one element can reduce or even destroy the value of the other elements."⁴⁵ The difference between the Rm. and the principles is only a matter of emphasis. In 1871 Menger wrote that the complete loss of value is an exception; in most cases the value will only be reduced.⁴⁶

Sixth. The exchange value can also be called public value. A short time later Menger must have become aware of the fact that this definition is neither clear nor useful, for during a later revision of his notes most of those about the public value were crossed out. Like labor value this term had only a short lived significance for his thinking.⁴⁷

In these notes of 1867 some essential elements are still missing. Menger has still to divide a group of consumer goods into pieces of equal quality, quantity and form. He has to identify marginal utility and the value of equal goods. He has not yet studied the maximisation of utility. All these essentials of Menger's doctrine must have been created between 1867–1871. Documents pertaining to these four years have not been found. The climax of his value investigations is reached in the *Principles*. According to the material known till this moment Menger added only one essential new thought between 1873 and 1921 to his value doctrine. In the principles and in his remarks to Gossen, Menger invariably claimed that man acts so that he can preserve and increase his personal welfare for his whole life.⁴⁸ In the fragment he admits one exception to this rule: "Preservation of life is not the highest goal for everybody."⁴⁹ Jevons and Walras have also seen this limitation of the "egotistical" motivation; they have come to the conclusion that marginal utility calculation cannot be applied to all human action. It is not quite clear whether Menger shared their opinion. Certainly, he did not read what the two Western economists had to say to this problem.⁵⁰ We have already mentioned, how little Menger knew about the mathematical theory of his time.⁵¹ These loopholes in his scientific education are especially conspicuous in his price theory, for which some additions can be found in Menger's unpublished work.

VI. Additions to the Price Theory

In two respects the unpublished material enlarges our knowledge of Menger's price theory. First, Menger, the opponent of mathematical economics, used in his unpublished comments to price analysis calculations, simple equations and geometrical figures. It is puzzling, how the same man can be in favor and against mathematics.⁵² He draws a demarcation line which he sometimes does not observe. His antimathematical

⁴⁵ Ibid.

⁴⁶ Carl Menger, *Grundsätze der Volkswirtschaftslehre*. Op. cit. p. 127

⁴⁷ Rm. 1.5.66.

⁴⁸ Grundsätze. p. 85, 86. H.H.Gossen, *Entwickelung der Gesetze* see list. Inside the front cover of the book. "Höchster Genuss des ganzen Lebens."

⁴⁹ Fragment, Blank page before table of contents.

⁵⁰ W. St. Jevons, *The Theory of Political Economy*. London 1871. p. 25–27. Léon Walras, *Etudes d'économie politique appliquée* Lausanne. Paris 1898. p. 458. Francois Bompaire, *Du Principe de Liberté Economique dans l'Oeuvre de Cournot et dans celle de l'école de Lausanne*, Paris 1931. p. 488.

⁵¹ P. 7.

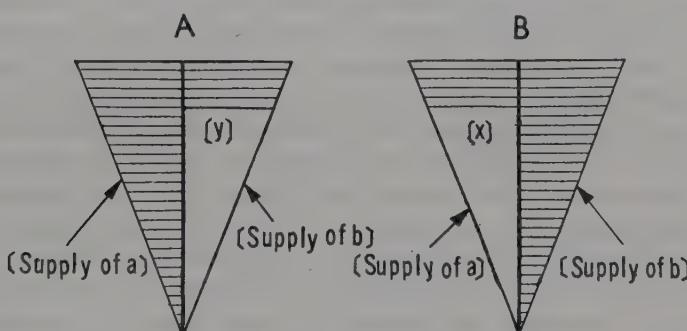
⁵² See correspondence Walras-Menger ed. Antonelli. loc. cit.

pronouncements are directed against an opponent whose achievements are not completely known to him. In the fragment he claims that the doctrine of supply and demand had reached its climax with Malthus!⁵³ This price explanation, so he writes in the fragment, in the remarks on Mill and later in his capital theory, leads to a vicious circle.⁵⁴ Prices are determined by the costs of production and costs of production are nothing but prices of factors, so that prices are really explained by prices. The correct explanation ought to begin with the consumer valuation.

Second. The development of Menger's value theory began with Kudler's handbook and reached its climax with the *Principles*. He started to work on his price theory in the Rm., and added to the analysis as long as he lived. In the Rm. he already explained the isolated exchange between two individuals. For the sake of clarification his sketchy mathematical notations had to be completed. A. and B. are two isolated persons who establish exchange relations.⁵⁵ A has a surplus of commodity a and a lack of commodity b, vice versa B has a surplus of b and a lack of a.

Menger's figure illustrates this situation:

Menger's figure Rm. P.7.
My interpretations are added in square brackets.



Under these circumstances A considers $b+y > a+x$ and B estimated $a+x > b+y$. Apparently x is any additional amount of a and y any additional amount of b. A wants more y and B more x. A will offer x against B's surplus of y and B offers y against A additional x. Offer and demand will continue, as long as both "can gain by exchange." A somewhat simplified explanation of the same case can be found in the *Principles*.⁵⁶ During the intermittent four years Menger has become cautious. In the Rm. Menger claims that A and B. must gain the same value by this exchange. The *Principles* do not contain this claim and in the remarks on Gossen the validity of this equality is questioned.

In the fragment Menger adds to the market models of the *Principles* two new cases: He mentions the differentiated monopoly price, which he explains in more details in the Sch. M.⁵⁷ Only the fragment but not the Sch. M. deals with the interdependence of prices.

⁵³ Fragment. p. 12

⁵⁴ Fragment. ibid. Carl Menger, "Zur Theorie des Kapitals" *Jahrbücher für Nationalökonomie und Statistik*. N. F. Vol. 17. Jena 1883. p. 28.

⁵⁵ Rm. P. 7. 179.

⁵⁶ Grundsätze. p. 158. Footnote.

⁵⁷ Fragment. p. 209. Sch. M. 202.

Menger's study of this problem did not go beyond the stage of preliminary note taking. In the beginning he remarks that "price formation has been explained for the case of two goods. Now an enlarged investigation has to include the price relation of all goods."⁵⁸ The exchange operations are determined by the quantities offered. The demand is regulated according to the formula $y/x=3y$. The good in demand is x , the commodity which the consumer owns is y , y/x is the price for x . A decrease or increase of supply may lead to a new planning of consumption. The consumer who maximizes his utilities, may change the application of his available means. Apparently Menger himself was not satisfied with the result of his thinking: he asks himself at the end of these remarks whether or not the theory of money could be used for further investigations of price interdependence. He did not try this approach, although he had developed rather early a detailed theory of money, with which he could operate.

VIII. *Menger's First Theory of Money*

In the year 1867 Menger had put his monetary analysis on a much broader basis than in his later article in the *Handwörterbuch der Staatswissenschaften*. In the Rm. the two sources of his thoughts are his personal observations of the monetary chaos in the Hapsburg monarchy⁵⁹ and the Hume-Ricardo balancing of international prices. In the article of the *Handwörterbuch*⁶⁰ Menger is influenced by Knies and the legal theories of money. The article in the HdW. is a terminological study which seems somewhat obsolete today. The fragmentary remarks in the Rm. form an interesting variation of classical monetary theory.

In the Rm. Menger develops two parts of a monetary theory. He deals with the definition of money and the international effects created by increasing the means of payment. Already in the Rm. Menger was an outspoken metallist. He never changed this viewpoint. Money is a commodity. Its value is guaranteed by gold and silver.⁶¹ Paper money is no commodity; it is only a warrant.⁶² His aversion to paper money is understandable since he lived through the Austrian inflation. His defense of metallic currency, however, is not derived from his personal experience but from the Hume-Ricardo theory. Like Hume the young Menger claims that it does not make any difference whether much or little gold is circulating.⁶³ But then Menger is frightened by the boldness of his own thought and adds that too much or too little gold could create difficulties.⁶⁴ What is too much or too little is not explained. In general Menger follows Hume and Ricardo and claims that a surplus of a gold will not exist. Price-, capital-, commodity-movements prevent, in the long run, the formation of a gold surplus or deficit. Such an equilibration does not exist, according to Menger, if paper money circulates. The international market-

⁵⁸ Fragment. p. 212 and attached page facing p. 212.

⁵⁹ *Fünfundzwanzig Jahre Österreichische Finanzpolitik*, (1848-1873) Ein historischer Rückblick. Leipzig 1874. Annoymous book. According to Menger "Angerstein" is the author.

⁶⁰ *Handwörterbuch der Staatswissenschaften*, Third edition. Vol. 4. (1909) P. 555 et seq.

⁶¹ Rm. p. 318 et seq.

⁶² P. 319 et seq.

⁶³ Rm. P. 327. David Hume, *Essays*. Vol. II. London 1760. Essay III, Of Money. P. 52.

⁶⁴ Rm. ibid.

reactions created by an increase of banknotes are only slightly indicated.⁶⁵ In connection with this analysis Menger discovers a price reaction which we call today the "sticky prices." The prices of gold and silver, he asserts, react stronger to an increase of paper than the prices of commodities. His explanations of this phenomena contain some valid observations. The uneducated people (*das dumme Volk*) calculate in small coins and are against changes. Transport costs and custom duties hinder the export of many goods, although prices abroad are higher than in the country of their origin.⁶⁶

This observation as well as his other monetary thoughts are not always original but they could be used as a first draft for a broad treatment of the subject. Yet his early monetary theory was buried between the covers of a book like many other remarks which are hidden somewhere in his library.

IX. Capital, Productivity and National Income

I found unfinished remarks about many aspects of economic theory, but only his notes about capital, productivity, and national income are worth repeating.

Menger exchanged letters about capital and interest with his student Boehm-Bawerk.⁶⁷ Boehm went his own way, but was most likely indebted to his teacher for one passage from the fragment.⁶⁸ If for a certain period a farmer needs seed grain x and labor y , and if $y=2x$, then after a few months he may harvest $6x$. As his expenditures are only $3x=x+y$, $y=2x$, after the harvest he will have a surplus of $3x$, i.e. $6x$ gross receipt minus $3x$ costs. If this farmer does not own an additional amount of $x+y$ to wait for the crop, he must forego the gain of $3x$. Menger used in the Sch. M. a similar calculation to determine present and future capital calculations.⁶⁹

The cost and profit accounting in the fragment has a great similarity with Boehm-Bawerk's third reason explaining the origin of interest. Boehm taught "that generally present goods are on account of technical reasons better equipped to satisfy our needs than future goods"⁷⁰

I have pointed out that Menger was not only interested in the special problem of capital productivity but also in the more general aspect of productivity, the law of diminishing returns. Due to the development during the last twenty years the contributions of older economists in this field are mostly dated. But Menger in his remarks to Mill had some modern viewpoints. He no longer believed that the law of diminishing return is valid in agriculture only; it exists in all kinds of productions, for, according to his opinion, the difference between industry and agriculture is only of practical and not of theoretical nature. In industry the newly established factories are the better ones; in agriculture the land last cultivated is the least productive. Menger saw in this law an explanation of optimal productivity: "each fixed capital can only be fructified to a certain

⁶⁵ Rm. P. 379.

⁶⁶ Rm. P. 379

⁶⁷ About the correspondence see List P. 2

⁶⁸ Fragment pp. 127, 129.

⁶⁹ Sch. M. P. 155.

⁷⁰ Boehm-Bawerk, *Kapital und Kapitalzins*. Second Part. *Positive Theorie des Kapitales*. 4th ed. Jena 1921. P. 339.

degree."⁷¹ Before the best combination of fixed and circulating capital is reached, a twofold application of labor may increase the return three times.

Although Menger was aware of an empty spot in his system, these remarks to Mill did not grow into a complete theory of productivity. In his theory of capital he complained that even the most learned economist cannot establish an accounting system which can be used by the business world.⁷² He regretted that this lack of scientific calculation was only one of many deficiencies in the theory of his time. Especially in the field of national income and income distribution prescientific thinking was still prevailing.⁷³ Economists did not understand the character of national income.

Consistent with his methodical individualism he saw in the national income a fictitious concept.⁷⁴ In spite of this verdict Menger did not intend to exclude the usage of this term. He even showed in the Rm. how this income can be added up, and warned against faulty computation: "The gross income of the baker contains the gross income of the farmer and after its deduction the gross income of the miller."⁷² In other words only the *net* revenues can be added. Menger understood the "value added" method and knew how to avoid its fallacies.

In the fragment, changes and distribution of national income attract his attention. The dynamic patterns of the great classicists are studied. Menger criticizes Say's and Ricardo's law of the market. The two economists had claimed that a general overproduction cannot exist, because nobody can buy who had not sold before. Since Malthus this theory was under continuous attack.⁷⁶ Menger, who was on the side of Malthus, formulated two objections:⁷⁷

(1) The theory is only a tautology. "Buying is in fact nothing but an exchange of products.
 (2) Menger blames Say for not paying attention to price changes. Here is, according to Menger, an essential omission, for during an overproduction caused by the destruction of credit all goods can be overproduced and sold only with loss. Say's system contains a defense against this objection which Menger rephrases: "Say will claim that under these circumstances the products which the producer buys with his undervalued products are also underpriced and so everything remains as it was." Menger thinks that Say forgets the debit and credit position of the firm, because a producer who has spent 100,000 fl., has only a gross income of 60,000 fl. from selling his product and if he has accumulated a debt of 80,000 fl., he must become bankrupt.⁷⁸ Here the study stops, the line of thought ends. Menger does not put forward his own explanation of crisis or income-distribution. The fragment is filled with such unfinished thoughts. A decline of Menger's productivity sets in. It passes away once. In his methodology Menger shows the same originality as in his *Principles*. But then the decline begins again. Menger writes a monetary theory which does not measure up to the broad scope of the original draft. He publishes less and less. His interest of studying new books decreases, fewer books are annotated and works of lasting scientific rank remain untouched.

⁷¹ Menger's marginal notes to J. St. Mill (see list p. 3) p. 336.

⁷² Menger, *Zur Theorie des Kapitals*. Loc. cit. p. 27.

⁷³ *Zur Theorie des Kapitals*. p. 28.

⁷⁴ *Zur Theorie des Kapitals*. p. 36.

⁷⁵ Rm. P. 310.

⁷⁶ J. R. Malthus, *Principles of Political Economy*. London 1820. (M.l.b.) P. 351 et seq.

⁷⁷ Fragment. Inserted page before P. 241

⁷⁸ Fragment. p. 241.

X. "Qui Trop Embrasse, Mal Étreint"

This decline is strange. Menger's surviving friends and students told me that he was active and alert till his end. He had resigned from his position at the age of 63 to devote all his time to writing a second edition of his *Principles*. He must have had full confidence in his intellectual abilities.

In his history of economic thought Othmar Spann explained Menger's decline of literary productivity differently.⁷⁹ He wrote that Menger believed neither in a further development of his system nor in the ability of his students to continue his work. This is not a convincing explanation. If Menger lost his faith in the validity of his system, why did he try time and again to finish the second edition of his *Principles*? Spann's main reference is Menger's speech in memory of Eugen von Boehm-Bawerk, which is indeed a strange eulogy. The master degrades the scientific qualifications of his deceased follower.⁸⁰ But this is a deplorable exception; mostly Menger had praised his students, Wieser, Boehm-Bawerk and others.⁸¹

Richard Schuller gave me a more plausible explanation: Menger had no time for further publications as long as he taught, for he devoted all his time to helping his students.⁸² Here is undoubtedly one valid reason, but it does not explain Menger's silence after 1903. Still other causes are revealed by the unpublished work. Menger attempted to do too much and tried to reach his objectives with time-consuming and inappropriate means.

Menger wanted to solve too many problems at once. "Qui trop embrasse, mal étreint." In the fragment he wrote about many, too many problems of practical and theoretical economics, e.g. the absolute rent, the differential rent, labor value, the existence level of wages, the wages fund, the Malthusian doctrine of population, productive forces of the nation, free trade, the history of currency etc.; he penned lengthy notes about the technic of coinage, the etymology of the word "Geld" (money), the production of gold and silver, and travelling in North Africa. While he worked on his *Principles* he knew the secret of writing: to husband one's forces and to focus one's attention on a few clearly defined objectives. Later he forgot his method. He spread himself over too many topics, and he wasted his efforts. The useless study of Rossi and Peshine Smith has been mentioned before. He changed the goal of his investigations. Instead of refining and expanding his theoretical system he became more and more enamored with definitions and distinctions. His article on money and the chapters on needs in the Sch.M. became a filigree-work of refined differentiations and special criteria. Like the majority of Austrian economists Menger was trained in the legal sciences.⁸³ It seems to me that the scientific approach

⁷⁹ Othmar Spann, *Die Haupttheorien der Volkswirtschaftslehre* 21st. ed. Leipzig 1931. p. 165. 25. edition. 1949. p. 185.

⁸⁰ Carl Menger, *Eugen von Boehm-Bawerk*. Almanach der kaiserlichen Akademie der Wissenschaften. Jahrgang 1915. Wien Staatsdruckerei. 1915.

⁸¹ See Carl Menger, *Die Irrthümer des Historismus*. Wien 1884. P. VIII. Same author, Zur Theorie des Kapitals loc. cit. p. 29. Footnote.

⁸² Schüller told me the following story: The young Schüller had prepared a paper for Menger's seminar. Menger corrected the paper eight times till he was satisfied.

⁸³ I cannot agree with Wieser's statement who claimed that the legal training was a good preparation for his and Menger's work. F. Wieser, *Gesammelte Abhandlungen*. Tübingen 1929. Paper about Carl Menger. p. 113.

of the lawyer gained more and more influence on Menger's working habits. The creation of terminology replaced the deduction of economic theory.

These and other reasons prevented Menger from finishing his work. This was undoubtedly a tragical disappointment for him, but a blessing for the young Austrian school. A finished system creates fanatical disciples who faithfully accept every word of the master; an unfinished work attracts independent thinkers who search for their own solutions. It is quite possible that the unfinished theories of the fragment were mentioned in Menger's lectures and discussed in his seminars.⁸⁴ His students may have used their master's ideas for further research. An exact proof for this relationship cannot be given, but some similarities are so obvious that they ought be mentioned.

Menger's influence on Boehm's capital theory has already been discussed. Menger's criticism of the labor value theory contains elements which have been integrated into Boehm's great and destructive attack on the system of Karl Marx. Hans Mayer based his critical analysis of the mathematical school on Menger's ideas. Following their mentor, Ludwig von Mises and his group reject the aggregate approach to this day. The problem of economic freedom, which Menger has described, reappears in Wieser's law of power.⁸⁵ The two contradicting methods, atomism and organism, had their impact on two antagonistic economic thinkers, Ludwig von Mises and Othmar Spann. Spann fights against atomism as strongly as Mises combats the organic method.—It is probable that the members of the Austrian school learned more from Menger than the valuetheory.

It is understandable that the students admired their master. Richard Schüller described Menger as a friendly, courteous gentleman who was always willing to help the young scholars. This impression may have been shared by many young economists who were members of Menger's seminar. In this picture the darker shades are missing which his published and unpublished work reveals. His attitude to Schmoller, to Walras, and to Lorenz von Stein was neither courteous nor friendly, nor tactful. He was very moody, he could praise and reject his best students, he could hold up Lorenz von Stein to ridicule, or he could write a eulogy about him. It is possible that his changing moods, his bitter remarks about friend and foe are connected with his two great disappointments: that many economists did not accept his ideas and that he was not able to complete his work. But Menger had a healthy and strong personality; he did not allow these darker feelings to dominate him. A strong self reliance and pride helped him always to redress the balance of his complex nature. He was proud that he; the son of an impoverished nobleman, had become the educator of a prince and the author of famous works. With a feeling of pride and defiance he wrote: "For my small efforts I will be rewarded with the conviction that in the field of German economy I have done, in more than one respect, a good work".⁸⁶

⁸⁴ Louise Sommer, Walther Fröhlich, and Richard Schüller told me that Menger gave those problems he had no time to solve, to his students for further investigation. It is possible that Menger used the fragment for a time as his lecture notes.

⁸⁵ F. von Wieser, *Das Gesetz der Macht*. Wien 1926. p. 187.

⁸⁶ *Irrthümer des Historismus*; op. cit. last sentence.

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